GENDER DIVISION OF WORK AND WAGES IN RURAL INDIA



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INTRODUCTION

The glaring disparity between wages earned by women and men is a salient feature of the Indian rural labour market. In the agricultural sector, for casual labour, the biggest category of workers, a wide differential exists between wages paid to male and female workers in same agricultural tasks. The gender wage gap in agriculture has been widely discussed in the literature (Boserup 1970, Jose 1988, Ramachandran 1990, Singh 1996, Himanshu 2017, Mahajan, and Ramasami 2017, Das and Usami 2017, Das 2020a, and Das 2020b). Numerous studies in the past have brought out three distinct features of wages for women workers and the gender wage gap in the rural labour market (Boserup 1970, Ramachandran 1990, Singh 1996, Das and Usami 2017 Das 2020a, Das 2020b, Jose 2017 and Mahajan and Ramaswami 2017 and Niyati 2021). First, female workers received lower wages than males in every operation, including weeding, sowing, and transplanting, which are primarily female-specific tasks (Ramachandran 1990, Das 2020a, Das 2020b, and Niyati 2021). Secondly, there is a substantial variation in gender disparities in wages across Indian states (Appendix Figure 2). The gender gap in wages is high in the southern and western Indian States, while it is relatively low in the northern and eastern Indian States (Boserup 1970, Das and Usami 2017, Jose 2017, Mahajan and Ramaswami 2017, and Das 2020a). Thirdly, time trends show that between 2007–08 and 2014–15, the male-female wage gap narrowed substantially as compared to the immediate post-liberalization period (see Figure 1). However, in the last five years, the gender gap in wages has begun to widen at the all-India level.

There are numerous hypotheses regarding the reason for gender wage differential and their trends over time. One of the most compelling theories behind variation in gender wage gap is that it is based on variations in female labour supply. The variations in female wages are more sensitive to female labour supply than male wages are to male labour supply. Therefore, female labour supply is an important determining factor in setting the female wage rates and its spatial variation is related to the gender wage gap (Boserup 1970, Rosenzweig 1978, Skoufias 1994, Singh 1996, and Mahajan and Ramaswami 2016).

Most explanations of wage differentials are provided in the framework of neoclassical theory (Singh 1996, Jacoby and Dasgupta 2015, and Mahajan and Ramaswami 2017) and related to differences in productivity or relative labour-demand-supply factors, and these are not very convincing. An alternative argument, pioneered by Dobb (1950), is that the wage differential stems from supply conditions among female workers, and the lower supply price of female workers

explains the lower wages for female workers. Das (2020a) using official databases showed that gender wage gap is not negatively correlated to female labour supply (or female workforce participation rates). Therefore, we need to look for alternative explanation for the gender wage differential in agriculture.

In this paper, along with labour supply, we identified gender division of work as an important factor that led to differential wage payments. Gender division of work is an important factor that leads to differential wage payment. There is a segregation of tasks performed by male and female workers. Even if both males and females participated in the same task, there is a further subdivision of tasks based on gender.

There are various factors that determine the gender division of labour, such as mechanization of agricultural operations, cropping patterns, the intensity of irrigation, material inputs, changes in the wage contract, migration and non-farm employment, and social and cultural factors. (Ramachandran 1990, Dhar 2017, Niyati 2020, and Usami, Das, and Swaminathan 2020). Mechanisation and the rise in piece-rated labour arrangements led to many changes in farming practices and, thus, altered the gender division of work over time and across the States (Ramachandran 1990 and Niyati 2020).

This paper first discusses the extent and magnitude of the gender wage differential in agriculture across a set of villages in different agro-ecological regions of the country. The study lays special emphasis on the gender division of work in agriculture and its implications for the gender wage gap. Secondly, to explain the gender wage gap, we use the Blinder-Oaxaca decomposition technique to identify how much of the gender wage gap is explained by the observable characteristics. Thirdly, we explore how the variation in female labour supply influences women's wages and leads to variation in the gender wage gap in agriculture. Thereafter, the paper examines the role of agroecology, cropping patterns, wage contracts, land distribution, and social groups in determining the wages for male and female workers in agriculture. This paper uses data from eight villages surveyed by the Foundation for Agrarian Studies between 2009 and 2019.

Database

The primary empirical analysis for the study is based on the rich household-level data from the village studies programme titled "Project on Agrarian Relations in India (PARI)" conducted in different parts of India by the Foundation for Agrarian Studies. This project involves detailed census-type household surveys in villages across diverse agro-ecological regions of India. The number of villages surveyed under PARI is now 27, for which data have been analysed for 8 (7)

irrigated and 1 unirrigated village). The selected villages are Venmani (Tamil Nadu), Palakurichi (Tamil Nadu), Alabujanahalli (Karnataka), Panahar (West Bengal), Kalmandasguri (West Bengal), Katkuian (Bihar), Nayanagar (Bihar) and Hakamwala (Punjab). These villages were surveyed by the Foundation between 2009 and 2019. These villages have been selected based on the magnitude of gender wage gap, regions (south-north-east dichotomy of gender wage gap), cropping pattern (Rice-wheat and commercial crop), agro-ecology, irrigation and composition of male and female labour supply. For example, official databases shows that gender wage gap is relatively high in southern Indian States and relatively low in northern Indian and eastern Indian States. To test the spatial variation in the gender wage gap hypothesis, we have selected 4 villages (Venmani, Panakurici and Alabujanahalli) from southern Indian states, four villages from eastern Indian States (Panahar, Kalmandasguri, Katkuian and Nayanagar) and one village (Hakamwala) from northern Indian States. Villages cover a wide range of agro-ecological regions and fall in different regions of the country (southern, northern, and eastern). The villages also cover diverse cropping patterns such as paddy, wheat, sugarcane, potato, vegetable, and other commercial crops. Above factors play a very important role of determining female labour supply and therefore the female wages in the agrarian economy. A brief description of the surveyed village is given in Appendix Table 1.

Alabujanahalli, Karnataka

Alabujanahalli village is in Maddur taluk of Mandya district in southern Karnataka. The village is a part of the urban periphery of Bengaluru and Mysore. Seventy percent of the households belonged to the Vokkaliga caste, a major landowning caste while remaining households were Scheduled Caste (SC) households. The village belongs to the Cauvery-irrigated region of Karnataka. Channel leading from system tank fed by canals from the Krishnarajasagr dam irrigates the village. It is a paddy and sugarcane-growing village, situated close to the major sugar factory of the region. Dairy and sericulture are important allied activities. A large number of medium and small cultivator households practice sericulture in the village. In most of the operations, the daily wage rates of female workers were half of the male workers. The agriculture sector was the major source of employment for all wage workers. The employment opportunities in the non-agricultural sector were limited for both, male and female workers. Non-agricultural employment in Alabujanahalli was primarily obtained from MGNREGS, with female workers receiving, on average 21 days of employment.

Kalmandasguri, West Bengal

Kalmandasguri village is relatively isolated and located in Koch Bihar district in the Terai zone of West Bengal. The major crops cultivated in the village were paddy, jute and potato with some irrigation. Scheduled Castes and Muslims are the two main social groups. In Kalmandasguri, the agriculture sector was the major source of employment for female labourers. The non-agriculture sector played an important role for male labourers. Migration or commuting from the village for non-agricultural work is a noticeable feature. For all major agricultural operations, wage rates for female workers were three-fourths of male wage rates in Kalmandasguri.

Panahar, West Bengal

Panahar is located in Kotulpur block of Bankura district in West Bengal. The village falls in the Old Alluvial region with almost 100 per cent groundwater irrigation. Panahar is a multi-caste village. Scheduled Castes (SCs) comprise 60 per cent of the population. The major crops grown in the village were an *Aman* (kharif) crop of paddy, a winter crop of potato, and *Boro* (summer) paddy or sesame. Agriculture is the major economic activity in Panahar. Most of the agricultural operations in both paddy and potato were done by male workers. Female participation in agriculture as family labour or wage labour is very limited. The wage rate for female workers was slightly lower than that of male workers.

Hakamwala, Punjab

Hakamwala is located in Mansa district, in the Malwa region of Punjab. Agricultural land in Hakamwala is irrigated by canal and tubewell. The main crops cultivated in Hakamwala were cotton, paddy, and wheat. Agricultural tasks were mostly mechanised. Big landlords employ longterm attached workers for agricultural work. Female participation in agriculture is restricted only to harvesting operation of cotton crops. Other agricultural operations in cotton, paddy and wheat are entirely done male workers. In addition to agriculture, construction work, and brick kilns in neighbouring areas provided some employment to the causal workers in the village.

Katkuian, Bihar

Katkuian village is located in West Champaran district in Bihar. Katkuian belongs to the northwest alluvial Gangetic region. The village is irrigated by canal and groundwater. The major crops grown are sugarcane and paddy. In Katuian, sugarcane absorbed the largest proportion of total labour use. Women from casual workers' households worked primarily as agricultural workers. Male workers migrate to various places in India to labour for agriculture and non-agricultural work. A seasonal migration of agricultural workers for paddy transplantation in the different parts of Punjab from Katkuian was observed.

Nayanagar, Bihar

Nayanagar is located in the north-west alluvial Gangetic region in Samastipur district of Bihar. About 97 per cent of the net sown area in this village is irrigated. Maize and wheat are the most important rabi crop in the village, and while kharif paddy, sugarcane and mustard were also grown. The major landowning caste in the village is Bhumihar who controls the wage labour market in the village. Male workers are engaged in almost all agricultural operations but in weeding operations, their numbers are less as compared to female. Female participation in non-agriculture activities was completely absent other than working under MGNREGS in Nayanagar. Seasonal migration is an important factor for male workers in Nayanagar.

Venmani, Tamil Nadu

Venmani village, Nagapattinam district, is located in the lower Cauvery delta. The village has seven hamlets, of which Kizh Venmani is the largest. The Kizh Venmani hamlet is the site of the atrocity that took place on December 25, 1968, when landlords burnt alive 44 men, women and children from Dalit agricultural worker families because Dalit workers in the village refused to disband the union of agricultural workers. There was a single season of cultivation in the village, with rice being the main crop, and green gram and black gram cultivated as subsidiary crops. Scheduled Castes (mainly Pallars and Paraiyars) constituted a majority of the village (63 per cent of all households). The main land-owning castes were Naidu (historically the landlords of the region) and Pillai. There is a very limited employment available for both male and female in agricultural sector in the village. Non-agricultural employment played a vital role in providing employment to both male and female workers. It is especially the MGNREGS which provided most of the employment in the village.

Palakurichi, Tamil Nadu

Palakurichi is a unique village that having been studied sixth time during the twentieth century. Palakurichi was studied first by students of Gilbert Slater, Professor of Economics at the University of Madras in1916, in the summer of 2019 by the Foundation for Agrarian Studies. Palakurichi is located at the tail end of the lower Cauvery delta of Nagapattinam district in Tamil Nadu. Naidu households remain the dominant caste group in the village while a majority of households (58 per cent) were Dalit households. The region suffered from low levels of water availability, poor drainage facilities, and floods. Only a single crop of paddy is cultivated in the village. Male casual workers were mainly engaged in non-agricultural work while female workers were engaged in agricultural and MGNREGS work. The data on wages for the wage workers have been used for the analysis. An important feature of the PARI village data is that wage data are collected at a disaggregated level: for wage workers, data are collected by gender, crop operation, season, type of wage contract, work hours, and mode of payment (cash and kind). This level of information is not available in official statistics such as the Wage Rates in Rural India of the Labour Bureau or the Periodic Labour Force Survey of the National Statistical Organisation.

The discussion on wages in this paper is based on the average wage earnings of all workers of the age group of 15 years and above. Any person employed for at least one day of wage work is included in the calculation. The PARI data cover two types of wage contracts prevalent in the villages: piece-rated and daily-rated. In piece-rated contracts, wages were paid based on either acreage or the volume of production. The average wage earning is derived by adding all earnings from wages – time-rated and piece-rated in agriculture and dividing the total by the days of employment in each agricultural operation. Data on actual work hours were collected for each task, but we converted days into standard 8-hour labour days for our analysis. To compare wages across villages, we have used the consumer price index for the agricultural labourer (CPI-AL) with 2009–10 as the base year.

To measure gender division of work, we have used labour absorption data. Data on labour absorption are available at a gender-disaggregated level on the number of days required for crop production (for each crop), forms of labour, and wages for different crop operations.

The PARI data also collected data on different socio-economic indicators, such as landholding, social group, age, education level of each individual, and place of work. These variables are mainly used in econometric analysis.

METHODOLOGICAL CONCERN MEASURING GENDER WAGE GAP

One of the issues for measuring the gender wage gap in agriculture is the disproportionate participation in agricultural operations by male and female workers. This study aimed at classifying the different agricultural activities performed by women and men and the values attached to each activity. Within agricultural operations, high-paid land preparation-related tasks, such as ploughing, levelling, and other intercultural agricultural operations, are male-specific. Transplanting and weeding, while open to male workers, are mainly performed by female workers. Intercultural operations and harvesting, threshing, and winnowing are done by both male and female workers. Field operations are often paid lower wages than land-preparation operations. Therefore, the

wages are determined based on the men and women's tasks. Since only a few operations are performed by male and female workers together, are the male and female wages comparable?

The gender division of labour is neither uniform across the regions nor over time. The gender division of work is more prominent in the southern Indian states than in eastern Indian states (Mencer and Saradamani 1982, Mencer 1993, and Niyati 2021). Niyati (2021) used village survey data to show that weeding and transplanting operations for paddy cultivation were exclusively done by female workers in southern villages, while it was done by both sexes in the West Bengal villages. Three conclusions can be made from the above discussion in relation to wage payment and gender division of work in agriculture:

1) It is hard to compare the wages that men and women receive, as only a few agricultural tasks are performed by both.

2) Wage discrimination is mediated by the gender division of labour, that is, operations in which male labourers participate are paid higher wages than the operations performed by female workers.

3) Within agricultural operations, gender wage gap is not comparable across the regions due to the geographical variation in the gender division of work.

Let us look at village data. Tables 1 and 2 show the share of female labour use in total labour use for specific crop operations of different crops. The major agricultural tasks in crop production are land preparations, sowing/transplanting, weeding, and intercultural operations (applying fertilizers, irrigation, applying plant protections, and harvesting and post-harvesting). First, except for Panahar of West Bengal and Hakamwala of Punjab, more than 60 per cent of total labour use in rice cultivation was done by female workers. Land preparation and intercultural operations were male-specific tasks, where more than 90 per cent of labour use was met by male workers. The harvesting and post-harvesting operations were done by both male and female workers. Besides harvesting and post-harvesting operations, we found a clear division of labour. In such cases, the gender wage gap is measurable for the harvesting and post-harvesting operations.

However, there was substantial geographical variation in the gender division of labour in agriculture. Transplanting and weeding operations were done exclusively by the female workers in southern (Alabujanahalli in Karnataka and Venmani and Palakurichi in Tamil Nadu) villages. In the eastern (Panahar of West Bengal) and northern (Hakamwala in Punjab) villages, transplanting was carried out jointly by the male and female workers.

Village	State	Land Preparation	Nursery	Transplan ting	Weeding	Irrigation /fertilizer /plant protection	Harvestin g and post harvesting
Panahar	West	4	5	33	18	1	16
	Bengal						
Kalmandasg	West	2	1	61	64	5	44
uri	Bengal	2	1	01		5	
Katkuian	Bihar	2	19	78	69	1	43
Alabujanaha lli	Karnataka	3	9	71	86	2	49
D11 · 1·	Tamil	7	24	78	96	7	25
Palakurichi	Nadu	/				/	33
	Tamil	(10	75	0.0	F	26
venmani	Nadu	0	10	/ 3	88	Э	20
Hakamwala	Punjab	0	0	50	17	0	13

Table 1 Share of female labour days in total labour used in different agricultural tasks of rice in study villages

Source: PARI data

Table 2 Share of female labour days in total labour used in different agricultural tasks of rice in study villages

Village	State	Crop	Land Preparati on	Sowin g	Weedin g	Irrigation/fertilizer/ plant protection	Harvesting and post harvesting
Panahar	West Bengal	Potato	6	29	18	4	22
Kalmandasg uri	West Bengal	Potato	20	56	63	30	61
Nayanagar	Bihar	Wheat	1	4	65	4	53
Nayanagar	Bihar	Maize	0	63	69	6	56
Katkuian	Bihar	Sugarca ne	1	51	5	1	27
Alabujanaha lli	Karnata ka	Sugarca ne	2	28	70	2	18
Hakamwala	Punjab	Wheat	0	0	2	0	66
Hakamwala	Punjab	Cotton	1	1	NA	1	32

Note: NA = not available

Source: PARI data

Secondly, even where male and female workers are employed for the same task, the component of each task performed varies significantly by gender. In other words, there is a gender division of sub-tasks in agriculture. For example, transplanting involves multiple sub-tasks: making bundles, transporting seedlings, and planting. The wage payment varies by sub-task and gender. Male workers were hired to make bundles and transport seedlings, and female workers were hired to plant saplings for different payments, making it difficult to interpret a single wage for a given operation and gender.

Appendix Figures 3 to 8 show the distribution of wages by days of employment in agriculture for male and female workers. The figure shows that wage rates vary significantly within villages, even for the same operation. The distribution of wages is more complicated when it is compared with the distribution of labour days employed for the different agricultural operations. The distribution reflects a bi-modal or multi-modal distribution of wage rates. The bi-modal or multi-modal distribution indicates multiple sub-tasks within the operations that may not be separable. There are many agricultural operations that have sub-tasks performed by male and female workers separately. This may lead to an incorrect estimation of the gender wage gap within the operations and across the regions.

LEVEL AND VARIATION IN AGRICULTURAL WAGES

Wage rates in agriculture vary with crop, crop operations, gender, and type of operations (Ramachandran 1990 and Dhar 2011). Wage rates vary significantly across the villages within the district, regions and states.

Because of the differential participation in agricultural operations by male and female workers across the villages, we have used a weighted average method to estimate wages and the female-tomale wage ratio. Table 3 shows the weighted average wage rates in agriculture deflated by the consumer price index for agricultural labourers (CPI-AL), with 2009–10 as the base year. In addition, we have also calculated simple average daily real wages for sowing, transplanting, weeding, and harvesting operation across the study villages (Appendix Table 2).

The weighted mean wage of females in a village (W_{η}) is the summation of the product of the proportion of females engaged in a particular operation to the total number of female workers engaged in agricultural work and the average wage of females for a particular operation.

Mathematically, it is given by the equation:

$$W_{vf} = \sum P_{ovf} W_{ovf}$$

where P_{ovf} = Proportion of females (f) engaged in operation (o) in the village (v) to the total female workers engaged in agricultural work.

 W_{ovf} = Average wage of female (f) for operation (o) in the village (v).

Similarly, the weighted mean wage of males in a village $(W_{\nu m})$ is the summation of the product of the proportion of males engaged in a particular operation to the total number of male workers engaged in agricultural work and the average wage of males for a particular operation.

Mathematically, it is given by the equation:

$$W_{vm} = \sum P_{ovm} W_{ovm}$$

where P_{ovm} = Proportion of males (*m*) engaged in operation (*o*) in the village (*v*) to the total male workers engaged in agricultural work.

 W_{ovm} = Average wage of male (*m*) for operation (*o*) in the village (*v*).

The female-to-male wage ratio is defined as

$$\frac{W_{vf}}{W_{vm}} = \frac{\sum_{o} P_{ovf} W_{ovf}}{\sum_{o} P_{ovm} W_{ovm}}$$

Village data shows a significant variation in wages for the male and female workers across the study villages. Overall, the level of wages was very low across all the villages. The level of wages for the male and female workers was much lower in the eastern Indian villages. The average wages obtained by the male and female agricultural workers were lower than the notified minimum wages in the eastern Indian villages.

In southern Indian villages (Alabujanahalli of Mandya in Karnataka and Venmani and Palakurichi in Nagapattinam district of Tamil Nadu) and Hakamwala of Mansa district of Punjab, the male wages were relatively high compared to wages for the male in the eastern Indian villages. In Palakurichi and Venmani (Nagapattinam district of Tamil Nadu), the wages received by the male agricultural workers were higher than the notified minimum wages, but this was not true for the female agricultural labourer.

It is important to note that when we compare the relatively agriculturally prosperous village of West Bengal (Panahar of Bankura district), the female wages were higher in Palakurichi and Venmani of Tamil Nadu than the male wages in Panahar in Bankura district of West Bengal. In Panahar of West Bengal, the average wage rate for male workers was Rs 88, while for the female agricultural labourer, it was Rs 88 to Rs 95. In Palakurichi of Tamil Nadu, the wage rates for male and female workers were Rs 218 and Rs 105, respectively. In the case of Katkuian in Bihar, the male wages were almost half of the female wages in Palakurichi and Venmani of Tamil Nadu.

Except for Panahar (Bankura district of West Bengal), female workers received lower wages than male workers. It can also be seen that female workers received lower wages than male workers for

female-specific operations such as transplanting, weeding, and harvesting operations (Appendix Table 2).

Within each village, there were significant variations in average wages between agricultural tasks. The wage rates for ploughing and other land preparation were much higher than the weeding and harvesting operations in the study villages.

Village	State	Female	Male	Female to male wages
Panahar	West Bengal	85	88	0.97
Kalmandasguri	West Bengal	76	100	0.75
Nayanagar	Bihar	60	81	0.74
Katkuian	Bihar	43	90	0.42
Alabujanahalli	Karnataka	74	161	0.45
Palakurichi	Tamil Nadu	106	213	0.5
Venmani	Tamil Nadu	100	191	0.54
Hakamwala	Punjab	108	159	0.68

Table 3 Weighted average wages of male and female workers at 2009–10 prices, and female-to-male wage ratio in agriculture, study villages

Source: PARI data

GENDER GAP IN WAGE RATES

Except for Panahar (Bankura, West Bengal), the gender wage gap persisted in all study villages. However, there was a substantial variation in the gender wage gap across study villages (Table 3). The gender wage gap was relatively large in the southern (Alabujanahalli of Mandya district in Karnataka and Palakurichi and Venmani of Nagapattinam district in Tamil Nadu) and one of our eastern villages (Katkuian of West Champaran district in Bihar). In these villages, the female workers received, on average, 50 per cent lower wages than the male workers. In Hakamwala (Mansa district of Punjab), Nayanagar (Samastipur district of Bihar), and Kalmandasguri (Koch Bihar district of West Bengal), the female-to-male wage ratio varied between 0.68 and 0.75 for the various agricultural tasks.

The existing literature argues that there is a southwest and northeast dichotomy in the gender wage gap in agriculture (Boserup 1970, Mahajan and Ramaswami 2017, Das 2020a,). More precisely, the gender wage gap is higher in the southern and western Indian states; and lower in the eastern and northern Indian states. However, village survey data shows a slightly different pattern and does not align with the official data sources. In this paper, we argued various factors determine the variation in the gender wage gap in agriculture, such as cropping pattern, crop operation,

agroecology, forms of wages, level of mechanization, and the relative supply of labour in agriculture.

There are three distinct features we observed in relation to the gender wage gap across the villages.

First, the gender wage gap was not uniform across villages within States. For example, the femaleto-male wage ratio was relatively low in Nayanagar (Samastipur district, Bihar), ranging between 0.70 and 0.76, whereas it was higher in Katkuian (West Champaran district, Bihar), ranging from 0.4 to 0.56 depending on agricultural operations.

Secondly, a relatively large wage disparity persists in rainfed single-crop villages in Kalmandasguri (Koch Bihar, West Bengal), whereas the disparity was minimal in the irrigated multi-crop village of Panahar (Bankura, West Bengal). The disparity was largely due to the low demand for labour in the unirrigated village, particularly for female workers. Labour use in crop production data shows that the per hectare labour for paddy crops was 119 days in the unirrigated villages of Kalmandasguri, whereas the total labour absorption for paddy crop was as high as 142 days in the irrigated village of Panahar in West Bengal. The variation in female labour supply also explains the difference in the gender wage gap within the states. In Panahar of West Bengal, female work participation rates were significantly low. The low female labour supply could be the reason for the lower gender wage gap in Panahar of West Bengal. Jose (2017) noted that the proportion of female agricultural labourers is historically low, and the gender wage gap is low in the high-productivity, paddy-growing district of the Indo-Gangetic regions.

Thirdly, there is systematic variation in the gender wage gap across all operations and villages. The gender wage gap was higher for harvesting and post-harvesting operations than the sowing, transplanting, or weeding operations. The village data show that the gender gap in wage rates was higher for harvesting and post-harvesting operations than for sowing, transplanting, or weeding operations in Katkuian, Palakurichi, Venmani, and Kalmandasguri (Table 4). These villages either lie in rainfed regions and single-crop cultivation areas or areas growing commercial crops like sugarcane. The gender wage gap for harvesting operations was lower than the sowing/transplanting/weeding operations in a village where the major crops were paddy and cotton.

Village	State	Sowing	Transplanting	Weeding	Harvesting
Panahar	West Bengal	1	0.97	0.98	0.98
Kalmandasguri	West Bengal	0.69	0.82	0.81	0.72
Nayanagar	Bihar	0.70		0.76	0.7
Katkuian	Bihar	0.4	0.56	0.5	0.5
Alabujanahalli	Karnataka	0.56	0.47	0.53	0.56
Palakurichi	Tamil Nadu		0.49	0.77	0.46
Venmani	Tamil Nadu	0.6	0.56	0.6	0.50
Hakamwala	Punjab			0.6	0.6

Table 4 Female-to-male wage ratios by agricultural operation in study villages

Source: PARI data

EMPIRICAL APPROACH TO MEASURING GENDER WAGE GAP

To measure and explain the extent of gender wage gaps, we use the Blinder-Oaxaca decomposition method and Pooled OLS model. The Blinder-Oaxaca decomposition method is used to explain how much the difference in mean outcomes across two groups is due to group differences in the levels of explanatory variables and how much is due to differences in the magnitude of regression coefficients (Oaxaca 1973, Blinder 1973, and Hlavac 2014). It starts with the estimation of wage equations separately for males and females:

$$W_i = \beta_i X_i + \boldsymbol{\varepsilon}_i, \tag{1}$$

where *i* indicates male (*m*) and female (*f*) agricultural workers; *W*, the dependent variable, is the natural log of wages; *X*, the explanatory variable, is the vector of variables that determines the wages; ε is the error term; and, *a* and β are the parameters to be estimated in the model. The explanatory variable *X* includes demographics variables, that is, age, sex, marital status, social group, agricultural operations (land preparation, nursery, irrigation, sowing, transplanting, weeding, harvesting, and other inter-cultural operations), crops cultivated, and contracts of wages.

We have applied twofold the Blinder-Oaxaca decomposition method. The estimated wage gap between males and females is decomposed into two components: explained components and unexplained components:

$$\bar{Wm} - \bar{Wf} = \hat{\beta m} \left(\bar{Xm} - \bar{Xf} \right) + \bar{Xf} \left(\hat{\beta m} - \hat{\beta f} \right) = E + U \tag{2}$$

where \dot{W} and X are mean values of dependent and explanatory variables, and β are the parameters of sub-samples of male and female workers estimated from equation (1).

The twofold decomposition divides the difference in estimated wage into a portion that is explained by cross-group differences in explanatory variables and a part that is remained unexplained by these differences. The first term on the right-hand side of equation (2) is the *"explained gap"* or *"non-discriminatory part,"* which is the portion of the average difference in wages between males and females due to the differences in men and women's measured characteristics.

The second term on the right-hand side of equation (2) is the "*unexplained gap*," which is the portion of the wage gap explained by differences in returns to measured characteristics. In the literature, the latter part of the equation, that is, the unexplained portion is often attributed to either discrimination or unobservable variables that are unable to explain the difference.

First, we regressed the log form of the wages on gender to ascertain the significance of the gender wage gap in agriculture across the villages (Table 5). The result showed a negative coefficient on the gender dummy, which is an indication of the gender–wage gap in agriculture. Except for Panahar (Bankura district of West Bengal), the gender–wage differential was statistically significant at a 1 per cent level of significance. In Panahar (Bankura, West Bengal), the male and female wages were similar. Therefore, we have decided to drop Panahar (Bankura, West Bengal) from further analysis.

Village	State	#Female	Constant	
Danahan	W/act Dancel	-0.010	1.97	
Pananar	west bengai	(0.005)	(0.002)	
Valar a daaraa	W/act David al	-0.16***	2.06***	
Kaimandasgun	west bengal	(0.008)	(0.006)	
NT	D'har	-0.14 ***	1.86***	
Inayanagar	Dinar	(0.013)	(0.008)	
Vathuian	Dibar	-0.32***	1.92***	
Katkulali	Dinar	(0.01)	(0.007)	
	<i>V</i> and take	-0.30***	2.21***	
Alabujananalli	Karnataka	(0.007)	(0.003)	
Palakurichi	Tamil Nadu	-0.29***	2.33***	

Table 5 Gender wage gap, study villages

		0.003)	(0.002)
Voomoni	Tamil Nada	-0.27***	2.30***
vennam	Tamii Nadu	(0.006)	(0.004)
Hakamwala	Punjab	-0.22***	2.15***
		(0.008)	(0.004)

Notes: *, **, and *** stand for significance level at 10, 5, and 1 per cent, respectively;

standard error in the parentheses. # Female stands for gender dummy, where the base is taken as male. *Source*: PARI data

Secondly, we undertake pooled OLS regression to identify the factor that significantly determines the gap in wages between male and female workers in agriculture across the study villages. Wages for each worker are regressed on gender, age, age square, marital status, cropping pattern, land holding, type of wage contract, and non-agricultural work. Participation and wages of male and female workers vary significantly across the agricultural task. Therefore, we have also controlled for the agricultural task in the OLS model. With these control variables, the results show that the female-to-male wage gap narrowed marginally across all villages. Therefore, the gender–wage gap persisted within the agricultural task.

Croups	Dependent Variable	Kalmandasgur	Nayanaga	Katkuian	Alabujanahall	Palakurich	Venmani	Hakamwal
Gioups	Dependent variable	i	r		i	i		а
	Female	-0.13***	-0.1***	-0.24***	-0.27***	-0.29***	-0.27***	-0.17***
Individual	Age	0.008***	0.006***	0.002	-0.009***	-0.001	0.000	0.005***
characteristics	Age square	-0.000***	-0.000	-0.00	-0.000***	-0.000	-0.000	-0.000***
	Married	0.021	-0.0042	0.021	0.011	0.0091	-0.0086	-0.013
Household characteristics	SC/ST/Muslim	0.015	-0.02*	-0.05***	-0.01*	0.003	-0.002	0.024*
	Land preparation/other intercultural operation	0.042*	0.056	0.01	0.014*	0.005	0.0078	-0.09**
Crop operations	Sowing	-0.02	0.0132	0.12***	0.003	0.002	0.004	-0.076*
	Weeding	-0.005	-0.040	-0.007	-0.17	-0.013**	-0.02*	-0.11***
	Harvesting	0.007	0.022	0.096	0.009	0.016*	-0.02*	-0.051**
Cropping pattern	Paddy	0.003	-0.54**	0.028*	0.015	0.02	-0.011	0.022*
Type of wage contract	Daily wage	-0.08***	-0.045*	0.091***	0.014*	-0.014	0.07***	0.10***
Land ownership	>0 to 1 hectare	0.022	0.008*	0.082***	0.028***	0.009	0.003	0.034***
1	Above 1 hectare	0.095***	-0.058*	0.006	0.037	0.000	0.006	0.081*
Non-agricultural work	Both Farm and non-farm	-0.016	0.034	0.0056	-0.056***	0.002	0.054	-0.015*
Constant		1.89***	1.72***	1.77***	2.42***	2.34***	2.22***	2.02***
R-squared		0.4	0.13	0.40	0.52	0.45	0.6	0.30
Ν		1347	792	2110	1919	967	1095	2088

Table 6 Pooled OLS regression for the log of real wages on individual characteristics in study villages

The result of the Blinder-Oaxaca decomposition across the villages is provided in Table 7. The table shows the estimated gender wage gap, explained and unexplained components of the measured gap. First, the unexplained part is higher than the explained part across all villages, pointing out the gender wage gap in agriculture, which points out the labour market discrimination or the effect of unmeasured factors such as institutional and cultural factors or a combination of these. Secondly, the unexplained gap is more than twice the explained portions in all eastern villages (Nayanagar and Katkuian of Bihar; Kalmandasguri and Panahar of West Bengal) and Alabujanahalli of Karnataka. On the other hand, the unexplained part is relatively low in the Palakurichi and Venmani of Tamil Nadu. The proportion of the gender wage gap, which the set of variables could not explain, confirms that the bias against females stems from the functioning of social institutions placed in rural societies.

Village	State	Mean of log of male wages	Mean of log of female wages	Differen ce (unadjust ed gap)	Explaine d gap	Explaine d gap, % of total	Unexplai ned gap	Unexplai ned gap, % of total
Kalmanda sguri	West Bengal	2.06	1.9	0.16	0.05	31	0.11	69
Nayanaga r	Bihar	1.86	1.72	0.14	0.11	32	0.24	68
Katkuian	Bihar	1.97	1.64	0.33	0.12	36	0.21	64
Alabujana halli	Karnatak a	2.14	1.84	0.3	0.09	30	0.21	70
Palakuric hi	Tamil Nadu	2.65	2.35	0.3	0.19	45	0.11	55
Venmani	Tamil Nadu	2.609	2.33	0.27	0.14	52	0.13	48
Hakamwa la	Punjab	2.191	1.974	0.22	0.12	41	0.10	59

Table 7 Twofold Blinder-Oaxaca decomposition results in study villages

Source: PARI data

INSTITUTIONAL FACTORS

Apart from task segregation, institutional factors like minimum wages law, forms of labour, local institution, labour union, play an important role in setting male and female wages and creating the gender wage gap. To demonstrate such institutional factors, we have used a case study of Palakurichi village. Palakurichi is located in Nagapattipam district (earlier East Thanjavur) of Tamil Nadu. One of the reasons for choosing Palakurichi village for this case study is that the village has

been studied at least six times during the last century spanning from 1918 to 2019. In 2019, the Foundation for Agrarian Studies conducted a census type of survey in the village. The main crop cultivated in the village was paddy which constituted 90 per cent of the gross cropped area.

In Palakurichi, there has been a significant decline in the number of agricultural labourers between 1983 and 2018 (Table 8). There are three probable reasons for the changes in the decline in agricultural labour. First, the decline in agricultural labourers was largely because of the increase in the mechanisation of crop operations, particularly harvesting, using combined harvesters during 2018–19. In 2018–19, cultivators started using weedicides which was not the case in 2003–04. Secondly, there is a shift of the male workforce from the agriculture to the non-agriculture sector. Thirdly, there is a decline in the share of landless households in the village. Much of these changes took place in the late 2000s when a Non-Government Organisation (NGO) called Land for Tillers' Freedom (LAFTI) facilitated land purchases for landless Dalit women in the village. The survey of 2018–19 reveals that 118 Dalit landless households in Palakurichi received up to one acre of land each through this process.

Though there is a decline in the number of agricultural labourers, the share of female workers has become much higher than that of male workers (Table 8). During this period, the gender wage gap also increased substantially (Table 9). Looking at the numbers, we may argue that the increase in the gender wage gap was primarily due to the relative changes in male and female labour supply. But this might not be the only reason for the increase in the gender wage gap. The institutional factors that are often ignored in the neo-classical model might also influence the gender wage gap in Palakurichi. Let us look at some evidence.

First, this region has a long history of organised labour movement, particularly demand for higher wages. The movement further intensified after the Keelavenmani atrocity in 1968. As a result, during this same period, two important agreements came into existence – Mannargudi in 1967 and Thanjavur in 1968. The 1968 Thanjavur agreement fixed the daily wage rates for males and females to six and five measures of paddy, respectively (Jeyaranjan 2022). Note that the male and female wages are set unequally. Even the notified minimum wage rates for males and females in the early eighties were unequal, as wages for males were 7 litres of paddy plus Rs 2.8 per day, whereas wages for females were 6 litres of paddy plus Rs 1.8 per day (Mencher and Saradamoni, 1982). Such an institutionalised understanding of differential wage payment by gender might be the root cause for the persistent gender wage gap in this region.

Secondly, since the mid-1970s, the wages for male and female workers have been decided by the Village Integration Council in Palakurichi. The Council was an informal body that contained members of mass organisations of agricultural workers, peasants, political parties, and big farmers in the village. The Council functioned as a platform for negotiation between workers and landlords. One of the key roles played by the Council was to decide on agricultural wage rates. The fact that wages set by this Council, an example of an institution, were also different for men and women is further evidence of reasons unrelated to the supply of labour in the market.

Year Male Female Total Female to Male ratio 1917 NA NA 120 1937 95 198 0.9 103 1983 249 227 476 0.9 2004 261 215 476 0.8 2018-19 151 225 376 1.5

Table 8 Number of agricultural labourers, Palakurichi, 1917 to 2018–19

Source: Slater (1917); Thomas and Ramakrishnan (1937); Guhan (1983); Surjit (2004); FAS survey (2018–19)

Table 9 Wages for the male and female workers, from 1983 to 2018–19, Palakurichi

Year	Male wages	Female Wages	Gender Wage Gap
1983	7 to 9	5 to 7	70
1996–7	45	35	78
1997–8	50	40	80
1998–9	60	45	75
2003–4	65	50	77
2018–19	400–50	200–50	50

Source: Guhan (1983); Jayaranjan (1996–9); Surjit (2003–4), FAS survey (2018–19)

FEMALE LABOUR SUPPLY AND GENDER WAGE GAP

Another aspect of the spatial variation of gender wage gap in agriculture was due to the variation in female labour supply. In this section, we examine the influence of variation in female labour supply on female wages, especially on the gender wage gap in agriculture. The conceptual and empirical evidence are drawn heavily from Das (2020).

Female labour supply is likely to be an important factor in the setting of female wage rates and variation of the gender wage gap in agriculture. The relationship between female labour supply and the gender wage gap is widely discussed in the literature. Boserup (1970) first established the negative relationship between female labour supply and the gender wage differential in developing countries. Using raw data from 1951 to 1956 for various agricultural operations, she concluded

that abundant women's labour supply keeps women's wages very low compared to men's. She observed that the female labour supply in southern India was high compared to that of northern India. In northern India, the low level of female participation rates was due to very few scheduled caste families, and the social and cultural norms prevailed in the region. She further pointed out that the variation of female labour supply is positively correlated with the female farming practices in the southern as well as a large part of tribal and scheduled caste families in central India.

Mahajan and Ramaswami (2017) tested the Boserup (1970) hypothesis in the neo-classical framework and confirmed the relationship between the gender wage gap and the female labour supply. Using NSS' 2004–05 data, they found two significant observations. First, male and female labour supply is not a perfect substitute. In other words, changes in male labour supply have a sizable impact on both male and female wages, whereas changes in female labour supply impact more female than male wages. They showed that a 10 per cent increase in female labour supply in agriculture increases the gender wage gap by 4 per cent, that is, female wages decrease by 5.2 per cent and male wages decrease by 1.3 per cent.

Using Agricultural Wages in India data of 1960-61, Rosenzweig (1978) try to establish the relationship between the changes in female labour supply on female and male wages. Rosenzweig (1978) concluded that the changes (increase) in female labour have a negative impact on female and male agricultural wages in rural India.

However, we noted a few gaps in Boserup (1970), Rosenzweig (1978) and Mahajan and Ramaswami (2017) studies. First, official data on wages, such as AWI and NSS, suffer from several limitations (Usami, Das, and Swaminathan 2021). Secondly, Mahajan and Ramaswami (2017) used per hectare female labour employment as a measure for the female labour supply. On the other hand, variables used from the FAS village survey are well defined, which enables us to look at the relationship between female labour supply and the gender wage gap in detail.

Female Labour Supply

To examine the female labour supply in agriculture, we have used two indications: the share of female agricultural workers among all female workers (absolute female labour supply) and the ratio of female agricultural labour to male agricultural labour (relative labour supply).

Before we estimate the magnitude of female agriculture labourers across the villages, it is important to define workers. The definition of the workers in the PARI village survey is different from official sources. We define a worker as an individual above the age of 15 years who has undertaken any economic activity, either directly as part of a production process or under supervision, irrespective of the number of work days (Dhar 2013, 2017, Usami et al. 2020, and Ramachandran 2020). Animal husbandry performed by an individual is considered work, whereas housework is excluded from the definition.

Females were largely engaged in animal husbandry, family labour or supervision in their own fields and agricultural labour. The female participation in the non-agriculture sector was limited, confined largely to MGNREGA across all study villages. Female agricultural labour from manual workers and small peasant households was the primary source of supply in the wage market. Apart from this, female family labour from small peasant households was a major source of supply for nonmechanised operations.

Table 10 gives work participation rates for the male and female workers across the villages. Data shows that the female work participation rates are much lower than the male, ranging from 47 per cent in Nayanagar of Bihar to 81 per cent in Kalmandasguri of West Bengal.

Village	State	Female	Male
Panahar	West Bengal	73	92
Kalmandasguri	West Bengal	81	92
Nayanagar	Bihar	47	81
Katkuian	Bihar	66	90
Alabujanahalli	Karnataka	63	86
Palakurichi	Tamil Nadu	76	85
Venmani	Tamil Nadu	72	85
Hakamwala	Punjab	78	91

Table 10 Workforce participation rates by gender, study villages, in per cent

Source: PARI data

Now we turn to estimate the female labour supply in agriculture across the study villages. Table 11 shows the share of female agricultural labour among the all-female workers and the ratio of female-to-male agricultural labourers across the villages. We defined agricultural labour as one who has participated in at least one day of agricultural activity outside the house as wage work. Except in Alabujanahalli of Karnataka village, more than one-third of women workers were agricultural labourers. The ratio of female agricultural labourers to male agricultural labourers varied from 0.6 to 1.5. Except for two villages in Tamil Nadu (Venmani and Palakurichi), the ratio was less than 1, which implies that male agricultural labourers were more dominant than female agricultural labourers.

Village	State	Share of female agricultural labourers among total female workers	Ratio of female to male agricultural labourers
Panahar	West Bengal	30	0.6
Kalmandasguri	West Bengal	53	0.8
Nayanagar	Bihar	32	0.7
Katkuian	Bihar	41	0.7
Alabujanahalli	Karnataka	26	0.7
Palakurichi	Tamil Nadu	50	1.5
Venmani	Tamil Nadu	44	1.4
Hakamwala	Punjab	34	0.9

Table 11 Share of agricultural labourers among total labourers and the female-to-male agricultural labour ratio in study villages

Source: PARI data

FACTORS AFFECTING FEMALE LABOUR SUPPLY IN AGRICULTURE

There are multiple factors that determine the female labour supply in agriculture. In this paper, we explore three factors that affect the variation and magnitude of female labour supply at the village level: social composition, the incidence of landlessness, the size of small farmers' households and the size of the manual labour workforce.

First, the proportion of female agriculture labourers among all female workers was relatively high in villages where the proportion of landless households was high (Table 12). For example, the proportion of female agricultural labourers was more than 40 per cent in Hakamwala (Mansa district, Punjab), Palakurichi (Nagapattinam district, Tamil Nadu), and Venmain (Nagapattinam district, Tamil Nadu), where the proportion of landless households was also more than 40 per cent. The proportion of female agricultural labourers was low in Alabujanahalli, where the proportion of landlessness was also low. Alabujanahalli belonged to prosperous regions, and an income effect could be a reason for the non-participation of women workers in the wage labour market. Another reason for low participation in female agricultural work was due to engagement in ancillary tasks (Niyati 2021). In the eastern Indian villages, the proportion of female agriculture labourers was relatively low, irrespective of the magnitude of landlessness. Along with the variation in the gender division of work, the cultural factor played an important role in low participation in wage work among female workers. Secondly, workers from manual worker households were major sources of labour supply to the wage labour market. Therefore, the variation of female agricultural labourers depends on the share of manual workers households in total village households. The variation of manual workers' households depends on the incidence of landlessness and the presence of SC households. We define manual worker households as those households whose main source of income comes from wage work (Ramachandran 2011). The participation in wage work of women from manual worker households was very high, at 30 to 63 per cent.

Thirdly, female agricultural labourers from manual worker households alone do not form the class of workers who are employed in wage work. Women from small peasant households participate in cultivation as family labour and also work outside the household as wage labour during times of seasonal demand in agriculture (Ramachandran 2020 and Dhar 2017). The definition of a small peasant is a peasant with an operational holding of less than 2 hectares, or 6 hectares of unirrigated land, or any combination thereof. The village evidence shows increasing participation of female wage workers from peasant households in the villages surveyed in southern India, as compared to those surveyed in the northern and eastern parts of the country.

Village	State	Share of manual worker households among total households	Share of small peasant households among total households	Share of landless households	Share of female agricultural labourers among total female workers
Panahar	West Bengal	30	58	44	30
Kalmandasguri	West Bengal	44	46	21	40
Nayanagar	Bihar	61	25	71	34
Katkuian	Bihar	63	24	53	15
Alabujanahalli	Karnataka	30	47	18	14
Palakurichi	Tamil Nadu	36	33	45	60
Venmani	Tamil Nadu	39	19	56	63
Hakamwala	Punjab	32	33	40	44

Table 12 Proportion of manual workers, small peasant households and landless households in total households and the share of female agricultural labourers among the total female workers in study villages

Source: PARI data

Fourthly, the variation of female agricultural labourers also depended on the composition of social groups in the village. Village data confirmed a positive correlation between female work participation in wage work and female workers belonging to SC and ST communities. The data

showed that the number of female agricultural labourers was higher in villages with a higher proportion of SC and ST households. The share of female agricultural labour supply was lower wherever the share of SC and ST households was low.

Next, we examine the relationship between female agricultural labour supply and the gender wage gap for harvesting operations in the study village (Figure 2). First, the correlation coefficient between the proportion of female agricultural labourers and the gender gap in wage rates was negative but weak (-0.35) for all study villages taken together. Secondly, the correlation coefficient between the ratio of female-to-male agricultural labour and the gender gap in wage rates was negative (-0.6) for all study villages. This signifies that a relative increase in female labour supply has a significant effect on the gender wage gap. Any changes in female labour supply have a significant impact on female rather than the male wages.

However, there is significant variation across the villages. The variations across villages can be better understood by looking at Figure 2. The figure has been divided into quadrants. The four quadrants in the left side plot are defined based on the mean gender wage gap (on the y-axis) and the mean share of female agricultural labourers in the total number of female workers (on the xaxis). Similarly, the right hand of Figure 2 is defined based on the mean gender-wage gap for harvesting operations (on the y-axis) and the mean ratio of the female-to-male agricultural workers (on the x-axis). The shaded area is the confidence interval along the negatively sloped linear line. We observed a complex relationship between the female labour supply and the gender-wage gap. The negative relationship between female labour supply and gender wage gap is not true for all villages. The gender wage gap was very high in Venmani and Palakurichi of Tamil Nadu, where both proportions of female agricultural labourers among the all-female labourers (absolute labour supply) and the ratio of female-to-male agricultural labour (relative labour supply) were high. Conversely, Panahar of West Bengal had a low gender-wage gap and low female labour supply. However, some villages did not fit into this pattern. We found several demand side factors also play an important role in determining variation in the gender wage gap in agriculture. We have explained the possible factors for each village.



Figure 1 Plot between gender (female to male) wage gap, the share of female agricultural labourers in the total number of female workers, and the ratio of female-to-male agricultural labourers. Source: PARI data.

Panahar (Bankura district, West Bengal) belonged to a low gender wage gap and low female laboursupply regions. Female labour supply partly explains the low wage gap in Panahar. The cropping pattern and demand for labour play an important role for relatively low gender wage gap in Panahar. Panahar is an irrigated, triple-crop-growing village in West Bengal. The major crops grown in the village were an aman (kharif) crop of paddy, a winter crop of potato, and a summer (boro) paddy or sesame. Most of the agricultural operations, including weeding and transplanting, were done by male workers. High demand for labour for the male workers and relatively low female labour could be the reason for low gender wage gap in Panahar. The participation in the non-agriculture sector was limited, confined largely to MGNREGA in Panahar, for male workers. The non-farm employment did not have an impact on the male wages.

Institutional factors such as the mode of wage payment and equal minimum wages in agriculture play a very important role in contributing to the low gender gap in Panahar. In Panahar, more than 40 per cent of hired labour days in agriculture were covered under piece-rated contracts. Secondly, the agriculture labour market is mainly controlled by two or three labour contractors. The labour contractor negotiates the wages with the employers and pays equal wages to the male and female workers. *Kalmandasguri (Koch Behar district, West Bengal)* belonged to relatively high gender wage gap regions with a high proportion of female agricultural labourers of the total number of female workers. Kalmandasguri was a rainfed, single-crop village wherein both the proportion of female agricultural labourers and the gender gap in wage rates were high. In Kalmandasguri, low productivity and profitability from crop production were associated with a lack of employment opportunities and poverty among households. The high female work participation in agriculture, low crop intensity and limited access to non-farm employment for female workers could be the reason for the wide gap in wage rates.

In addition, non-agricultural employment played an important role in higher wages for male labourers in Kalmandasguri. Male workers were employed in the construction sector due to rapid urbanisation in nearby towns. Migration from the village for non-agricultural employment to Kerala, Noida and Delhi was also substantial. The migration to the cities for higher-paying, particularly non-agricultural activities, led to higher male wages and a larger gender wage gap in Kalmandasguri.

Nayanagar (Samastipur district, Bihar) belonged to relatively high gender wage gap regions, but a relatively low female labour supply. Therefore, the female labour supply failed to explain the higher gender wage gap in agriculture. The reason for the high gender wage gap in agriculture may be on account of cropping patterns, a high degree of inequality in land ownership, and control of landlord and rich peasant Bhumihar households over the level of wage rates. This region is prone to flooding. During the reference year, a significant proportion of land under the paddy crop was affected by the flood during the kharif season. Maize and wheat were the primary crops cultivated in the villages during the reference year. These two crops were mainly absorbed by male workers. Despite the low female labour supply, the nature of the crop was the reason for the higher gender wage gap in Nayanagar.

In *Katkuian (West Champaran district, Bihar),* the gender wage gap is very high (42 per cent) and has a low female labour supply. The high gender wage gap can be explained through crop cultivation. Sugarcane is an important crop accounting for 43 per cent of the total gross cropped area. The demand for male workers for various tasks in sugarcane cultivation was relatively high than that of female workers. The share of female labour use in total labour use was only 21 percent in sugarcane cultivation.

The male workers received slightly better wages due to participation in non-agricultural activities and outmigration. Workers migrated to various places in India to labour in agricultural and nonagricultural tasks. A seasonal migration of agricultural workers for paddy transplantation in the different parts of Punjab from Katkuian was observed. This seasonal migration, participation in non-agricultural activities and sugarcane cultivation might be the pull factor for the relatively higher wages of male workers than female workers.

Alabujanaballi (Mandya, Karnataka) belonged to the regions where gender wage gap is very high, but relatively low female labour supply. The major crops grown in the villages were sugarcane, paddy, ragi, and mulberry. The wage gap could be explained by the gender division of labour with respect to crops and their operations. In Alabujanajhalli, about 64 per cent of land under cultivation was under sugarcane and other perennial crops. These crops generated employment primarily for male labourers, for example, weeding by the use of bullocks in the sugarcane fields. In sugarcane operations, female workers received one-third of male wages, while the wage gap was smaller for paddy transplanting and weeding operations. Though the Alabujanahalli is close to the Mandya and Maddur, dependency on the non-farm casual employment is limited. More than 80 per cent of all wage workers were employed in the agricultural sector. The non-farm sector has a negligible role in determining higher wages for the male workers.

Venmani and Palakurichi (Nagapattinam district of Tamil Nadu) belonged to the regions where gender wage gap and female labour supply were very high compared to other study villages. Another marked feature – the ratio of female-to-male labour supply – is greater than the one indicating that relative changes in the female supply have a significant impact on female wages and the gender wage gap. Therefore, the relatively high female labour supply could be one of the reasons for the higher gender wage gap. Along with female labour supply, the institutional factor, low yield of paddy crop, lack of employment in agriculture, and higher participation in the non-farm sector for the male workers could be attributed to the higher gender wage gap in Venmani and Palakurichi. The institutional factor, unequal minimum wages in agriculture by gender, could be one of the root causes for the higher gender wage gap in these villages. The institutional factor has been discussed in detail in the previous section of this chapter.

FACTORS AFFECTING THE WAGE RATES

The ordinary least square regression (OLS) model is used to understand the probable factors that determine the wages for both males and females in the study villages. Separate models are estimated for male and female workers belonging to the age group of 15 years and above for each village. The response variable used for our econometric model is the natural logarithm of wages received by both male and female workers. The wage equation is estimated after controlling untransformed (linear) variables such as socio-economic characteristics, experience (age), demand for labour, and the labour market conditions in this study.

The mathematical form of the fitted model is given below:

 $\ln \ln (Y_i) = \sum_{j=1}^p X_{ij}\beta_j + \varepsilon_i , \qquad (1)$

where Y_i represents the natural logarithm of wages received by workers i

i = 1,...., *n*, and *j* = 1,...., *p*.

 X_{ij} represents the *jth* characteristics of workers,

and *i* and *ij* are the corresponding parameters.

The various factors determine the level of wages across regions and gender. The most important factors leading the regional variation in agricultural wages were: cropping intensity, agricultural productivity, agricultural prices, non-farm employment, the intensity of MGNREGS and outmigration (Bardhan 1977, Himanshu 2006, Srivastava and Singh 2006, Jose 2013, Himanshu and Kundu 2016, and Himanshu 2017). The independent variables used to explain the factors affecting the wage rates for females and males includes individual characteristics, household characteristics, cropping pattern and crop operations, sector of work, and type of wage contracts. Individual characteristics include age, gender, marital status, and education level of workers. Household characteristics include caste and land ownership of households. The details of explanatory variables are given below:

Groups	Variables	Туре	Definition
Individual Characteristic	5		
Age	Age	Continuous	Workers aged 15 years and above
nge	Age Square	Continuous	Square of the age of workers
Gender	Male: Base category		
Genuer	Female	Categorical	1 - Female; 0 - Otherwise
Marital status	Never married/Widowed/Separated/Divorced: Base cat	egory	
Maritar Status	Married	Categorical	1 - Married; 0 - Otherwise
Household characteristics			
Caste	OBC/Others: Base category		
Caste	SC/ST/Muslims	Categorical	1 - SC/ST/Muslims; 0 - Otherwise
	Landless: Base category		
Land Ownership	0 to 1 hectare	Categorical	1 - >0 but ≤ 1 hectare; 0 - Otherwise
	Above 1 hectare	Categorical	1 - >1 hectare; 0 - Otherwise
Cropping pattern and Cr	op operations		
	Transplanting: Base category		
	Land Preparation/Nursery/Irrigation/Other	Categorical	1 - Land Preparation/Nursery/Irrigation/Other operations 0 - Otherwise
Crop operations	operations		
orop operations	Sowing	Categorical	1 - Sowing; 0 - Otherwise
	Weeding	Categorical	1 - Weeding; 0 - Otherwise
	Harvesting	Categorical	1 - Harvesting; 0 - Otherwise
Cropping pattern	Sugarcane/Potato/Wheat/Maize/Cotton: Base category		
9-9FF8F	Paddy	Categorical	1 - Paddy; 0 - Otherwise
Type of wages and Sector	of work		
Type of wage	Piece-rated: Base category		
contracts	Daily	Categorical	1 - Daily; 0 - Otherwise
	Agricultural sector: Base category		
Sector of work	Both agricultural and non-agricultural sectors	Categorical	1 - Participated in both agricultural and non-agricultural work; 0 - Otherwise

Table 13 Description of explanatory variables used in the analysis

Result

Appendix Tables 4 to 8 show the summary of regression results for males and females separately across the study villages. We have explained the results from OLS regression for each region, namely the eastern villages (Katkuian in West Champaran district and Nayanagar in Samastipur district of Bihar; Kalmandasguri in Koch Behar district and Panahar in Bankura district of West Bengal), southern villages (Palakurichi and Venmani in Nagapattinam district of Tamil Nadu; Alabujanahalli in Mandya district of Karnataka) and northern villages (Hakamwala in Mansa district of Punjab).

Eastern Villages

In Katkuian, the regression result shows that most of the factors have a significant impact on wages for both male and female workers. The male and female workers from SC and ST households earned significantly lower agricultural wages than the other caste households (at a 1 per cent significant level). This indicates that there is caste discrimination in relation to wages in the labour market. Among crop operations, sowing and harvesting had a significantly positive impact on female wages compared to transplanting operations. For males, land preparation, irrigation, sowing and harvesting operations have a positive impact on wages as compared to transplanting operations. Sugarcane accounted for 43 per cent of the total gross cropped area, followed by paddy crop (37 per cent) in Katkuian. In relation to the sugarcane crop (reference crop), wages were lower for paddy in Katkuian for the male workers and statistically significant at a 1 per cent level. In the case of female workers, the paddy crop had a positive and significant impact on the female wages in Katkuian. Daily-rated contract yields lower wages for both male and female as compared to the piece-rated contract.

In Nayanagar, very few variables had a statistically significant impact on the wage for both males and females. Age has a positive impact on wages for both male and female workers in the village. Female workers engaged in daily wage contracts earned lower wages as compared to the piecerated contract. In the case of male workers, workers engaged in both agricultural and nonagricultural work.

In Kalmandasguri, female workers from SC, SC and Muslim households earned higher wages as compared to workers from other households. Harvesting and sowing operations had a negative effect on female wage earnings and receiving lower wages for sowing and harvesting operations as compared to transplanting operations. Land preparation had a positive impact on wages for the male workers in Kalmandasguri. Both females and males working under daily wage contracts received lower wages as compared to piece-rated contracts. For males, workers engaged in both agricultural and non-agricultural work had a negative and significant impact on wage earnings.

In Panahar, female workers engaged in harvesting and land preparation operations earned higher wages as compared to transplanting operations. For both males and females, piece-rated contracts yield higher wage earnings for both male and female workers as compared to daily wage contracts. Also, for both male and female workers, land ownership of 0 to 1 hectare, and 1 hectare and above had a positive and significant impact on wages. In the case of a male, SC/ST/Muslim workers earned higher wages as compared to other castes.

Northern villages

In Hakamwala, female workers from SC households received higher wages as compared to workers from other caste households. Weeding operations had a significantly negative impact on female wages. They received lower wages in weeding operations as compared to transplanting operations. For male workers, wage earnings were significantly low for crop operations like land preparation, nursery, irrigation, other intercultural operations and weeding. Paddy crops yield higher wages for males as compared to other crops cultivated in the village. Daily wage contracts have a positive effect on wages for male workers as compared to piece-rated wage contracts. Also, male workers participating in both agricultural and non-agricultural work had a negative and significant impact on male wage earnings.

Southern villages

In Alabujanhalli, few variables are statistically significant in explaining the wage rates for both males and females. Female workers from SC and ST households earned higher agricultural wages than the other caste households. This is not the case for male workers as they received lower agricultural wages than workers from other caste households. Types of wage contracts are also significant, impacting the wages for both males and females. For females, daily wage contracts yield lower wages whereas it yields higher wages for males. Both male and female workers engaged in agricultural and non-agricultural work had a negative effect on their wages.

In Venmani, none of the variables is statistically significant in explaining the agricultural wages for females. For male workers, among the crop operations, harvesting and weeding operations yield lower wages than other crop operations. Male workers engaged in daily-rated contracts received higher wages than the piece-rated contracts. Male workers engaged in both agricultural and nonagricultural work earned higher wages than workers only engaged in agricultural work.

Even in Palakurichi, very few variables are significantly affecting the wages for female workers. For female workers, daily wage contracts negatively affect their wages. They receive lower wages in daily wage contracts as compared to piece-rated contracts. In the case of males, crop operations like weeding yield lower wages compared to other operations.

DISCUSSION

Agriculture is the biggest single employer of women in India, and "Agricultural labour" the largest single occupation. It follows, then, that the wage rate for agricultural labour is a key determinant of women's earnings. Wage discrimination against women in form of gender wage gap was experienced by the all-female labourers in rural India noted in the literature (Boserup 1970, Jose 1988, Ramachandran 1990, Singh 1996, Himanshu 2017, Mahajan, and Ramaseami 2017, Das and Usami 2017, Das 2020a, and Das 2020b). The female workers received lower wages than males in operation, where female participation rates were very high (Jose 1988, Ramachandran 1990, Mahajan and Ramaswami 2017, Das 2020a and Das 2020b). Further, since 1950, the gender wage gap varies across the regions (Boserup 1970, Singh 1996, Mahajan and Ramaswami 2017). In southern Indian states, female workers received 60 to 65 per cent of the male wages. On the other hand, female workers received 85 to 90 per cent of the male wages. Recent data shows a similar pattern of regional variation in the gender wage gap in agriculture (Das and Usami 2017, Jose 2017 and Mahajan and Ramaswami 2017). Using official databases, the study by Boserup (1970), Singh 1996 and Mahajan and Ramaswami (2017) explained the gender wage gap through the lens of female labour supply. Any changes in the female labour supply affect more on female wages than male wages in agriculture.

This paper describes and examines the possible factors determining male and female wage rates and the gender gap in wage rates at a dis-aggregated level- for example, at the level of individual crops, crop combinations and crop operations, using eight village survey data across five states from the archive of the Foundation for Agrarian Studies. To test the regional variation in the gender wage gap, we have selected three villages from southern Indian states, four villages from eastern Indian states and one village from northern Indian states. The villages were drawn from the range of agro-ecological zone and cropping patterns. The paper concluded that, female labour supply partially explains the gender wage gap in agriculture. Along with female labour supply, we identified gender division of work as an important factor that leads to differential wage payments. Wage rates varied significantly by crop, task and sub-task. Gender wage gap varies significantly across the village. The paper tries to argue that is not a state-specific phenomenon but depends on agro-ecology, cropping pattern, crop intensity and institutional factors.

CONCLUSION

This paper inquires about the determination of male and female wages, and the gender wage gap in relation to the gender division of labour using village survey data from the Foundation for Agrarian Studies. The villages selected for the study belong to different agro-climatic zones and a wide range of cropping patterns in the states of Karnataka, Tamil Nadu, Punjab, West Bengal, and Bihar. This paper is unique from the existing literature as it used rich primary data on wages and employment. The villages data provided disaggregated data on wages and division of work by crop, crop operations (task and sub-task), type of wage contract (daily rated and piece-rated) and gender that allowed us to examine the gender wage gap in relation to the gender division of work. The main findings of the paper are as follows:

First, data shows that wages for male and female workers varied significantly across crops and crop operations and the villages. The level of wages was comparatively low in the eastern Indian villages (Katkuian and Nayanagar of Bihar, and Kalmandasguri and Panahar of West Bengal) for both male and female workers. A most striking feature of real wages for females in agriculture in the southern Indian villages, particularly in Tamil Nadu, is higher, in absolute terms, in relation to male workers in the eastern Indian villages.

Secondly, another marked feature is the wide differential that exists between wages paid to male and female workers in the different crop operations across all villages. However, Panahar of West Bengal is an exception, where male and female workers received equal wages due to the existence of labour contractors who pay equal wage for all. The magnitude of gender wage gap varied significantly across the villages. Female workers received half of the wage paid to male workers in southern Indian villages. However, it does not exactly fit into the argument of the South/West and North dichotomy. Female workers received much lower wages than the male workers in two study villages in Bihar (Katkuian of West Champaran district and Nayanagar of Samastipur district) and villages in West Bengal (Kalmandasguri of Koch Behar district). Therefore, in this essay, we tried to argue that the gender–wage gap can be attributed to crop cultivation, agroecology, gender division of work, crop intensity, and the absolute and relative female labour supply.

We found that the gender division of tasks and sub-task is an important factor that leads to differential wage payments by gender. In other words, the variation in male and female wages in agriculture is primarily determined by their disproportionate participation in tasks and sub-tasks Thirdly, to estimate the gender wage gap, we employed a Blinder-Oaxaca decomposition technique. The Blinder-Oaxaca decomposition analysis suggests that a large proportion of wage differential is unexplained and attributed to labour discrimination. Apart from labour market discrimination, institutional factors play a significant role in determining differences in male and female wages in agriculture. The standard demand-supply model of wage determination often ignores the institutional factor.

Fourthly, we explored the relationship between the supply of female agricultural labour (size of the female agricultural workforce and relative changes in the female labour supply) and the gender wage gap. We, however, observed a more complex relationship between the proportion of female agricultural labourers and the gender gap in wage rates.

Lastly, we attempted to quantify the impact of various factors on the wage of male and female workers using multiple regression analysis. The regression results show that male and female wages were determined by the distinct set of variables within and across the villages. The demand side factor played an important role in determining wages for both male and female workers in the study villages.

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Appendix

Village	District	States	Region	Year of survey	Agro-ecological zone	Type of irrigation	Major crops	Selected crop (% of total GCA)
Alabujanahalli	Mandya	Karnataka	South	2009	Southern Dry	Canal	Sugarcane, Paddy, Ragi, and Mulberry	Paddy (40), Sugarcane (36)
Kalmandasguri	Koch Behar	West Bengal	East	2010	Terai zone	Un-irrigated	Paddy, Jute, and Potato	Paddy (48), Potato (16)
Panahar	Bankura	West Bengal	East	2010	Old alluvial	Groundwater	Paddy, Potato, and Sesame	Paddy (66), Potato (23)
Hakamwala	Mansa	Punjab	North	2011	Trans Gangetic plain 6	Tubewell and Canal	Cotton, Paddy, and Wheat	Wheat (44), Cotton (28), Paddy (15)
Katkuian	West Champaran	Bihar	East	2012	North West Alluvial Plain	Canal and Groundwater	Sugarcane, Paddy, and Wheat	Paddy (37), Sugarcane (43)
Nayanagar	Samastipur	Bihar	East	2012	North West Alluvial Plain	Groundwater	Paddy, Wheat, and Maize	Wheat (28), Maize (22)
Venmani	Nagapattinam	Tamil Nadu	South	2019	Eastern Coastal plains	Canal	Paddy	Paddy (60)
Palakurichi	Nagapattinam	Tamil Nadu	South	2019	Eastern Coastal Plains	Canal	Paddy	Paddy (97)

Appendix Table 1 List of selected villages, year of survey, agro-ecological zones, types of irrigation, major crops cultivated and selected crop for study

Source: FAS Survey data

Village	State	Sowing		Transpl	Transplanting		Weeding		esting
		Female	Male	Female	Male	Female	Male	Female	Male
Panahar	West Bengal	91	91	90	92	88	90	90	92
Kalmandasgu ri	West Bengal	70	101	77	94	81	100	76	105
Nayanagar	Bihar	54	83	NA	NA	52	69	51	74
Katkuian	Bihar	42	105	45	64	40	66	40	83
Alabujanahall i	Karnataka	86	155	72	155	82	156	79	155
Palakurichi	Tamil Nadu	NA	208	107	218	105	137	105	229
Venmani	Tamil Nadu	99	172	102	206	100	167	99	187
Hakamwala	Punjab	NA	166	NA	NA	90	147	103	175

Appendix Table 2 Average wages for female and male workers, study villages, at 2009–10 prices in Rs

Note: NA = not available

Figure 1 Ratio of male to female wage rates for STW, HWT, and unskilled non-agricultural occupations, 1998–99 to 2018–19



Source: Wage Rates in Rural India, abour Bureau,

Source: Computed from Wage Rates in Rural India, various issues.

Appendix Figure 2 Male-to-female wage ratio across states



Source: Wage Rates in Rural India, 2018-19



Appendix Figure 3 Kernel density plot of wage rates for paddy crop, Palakurichi

Source: PARI data

Appendix Figure 4 Kernel density plot of wage rates for paddy crop, Katkuian





Appendix Figure 5 Kernel density plot of wage rates for paddy crop, Panahar

Source: PARI data

			Katk	kuian		Nayanagar			
Groups	Variables	Ν	Iale	Fer	nale	М	ale	Fe	male
		Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
т 1' ' 1 1	Age	0.001	0.003	0.004	0.003	0.014***	0.004	0.009*	0.004
Characteristics	Age_Sq	0	0	0	0	0**	0	0	0
	Married	0.072**	0.027	-0.034	0.02	-0.045	Male I Estimate Std. Error Estimate 0.014*** 0.004 0.009* 0** 0 0 -0.045 0.03 -0.048 -0.001 0.017 -0.029 0.027 0.041 0.101 0.003 0.046 0.031 -0.022 0.046 0.006 0.026 0.041 0.002 -0.048* 0.023 -0.071* 0.028 0.02 - 0.017 0.025 0.025 0.07 0.062 - 0.086*** 0.018 0.041 1.493*** 0.079 1.709** 0.152 0.209 488 304	-0.048	0.027
Household Characteristics	SC/ST/Muslim	- 0.052***	0.015	-0.043**	0.015	-0.001	0.017	-0.029	0.025
Crop Operations	Land Preparation/Nursery/Irrigati on/Other operations	0.258***	0.029	0.069	0.043	0.027	0.041	0.101	0.105
	Sowing	0.173***	0.038	0.123***	0.034	0.003	0.046	0.031	0.084
	Weeding	0.024	0.034	-0.017	0.024	-0.022	0.046	0.006	0.077
	Harvesting	0.144***	0.03	0.116***	0.026	0.026	0.041	0.002	0.078
Cropping Pattern	Paddy	-0.041**	0.015	0.156***	0.02	-0.048*	0.023	-0.071*	0.031
Type of Wage Contract	Daily wage contract	-0.041*	0.016	-0.134***	0.019	0.028	0.02	- 0.146***	0.032
	0 to 1 hectare	0.108***	0.016	0.043*	0.017	-0.035	0.027	0.025	0.044
Land Ownership	Above 1 hectare	0.042	0.043	-0.102*	0.05	0.07	0.062	- 0.199***	0.053
Non-Agricultural Work	Both agricultural and non- agricultural participation	0.016	0.015	0.006	0.039	0.086***	0.018	0.041	0.028
Constant		1.695***	0.064	1.509***	0.062	1.493***	0.079	1.709***	0.106
R-squared		0.203		0.241		0.152		0.209	
N		1284		826		488		304	

Appendix Table 3 Summary of regression analysis of wage earning by sex in Katkuian and Nayanagar, Bihar

Notes: Significance, codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

			Kalmar	Idasguri		Panahar			
Groups	Variables	М	ale	Fer	nale	М	ale	Fe	male
		Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Tradiani dan al	Age	0.003	0.004	0.01***	0.002	-0.006**	0.002	-0.011**	0.003
Characteristics	Age_Sq	0	0	0***	0	0**	0	0**	0
	Married	0.052	0.031	0.033	0.017	0.034*	0.016	0.018	0.017
Household Characteristics	SC/ST/Muslim	0.009	0.017	0.029*	0.014	0.015*	0.007	0.022	0.02
Crop Operations	Land Preparation/Nursery/Irrig ation/Other operations	0.085***	0.024	-0.037	0.023	-0.002	0.008	0.056**	0.018
	Sowing	0.024	0.048	-0.061*	0.026	-0.005	0.013	0.029	0.023
	Weeding	-0.005	0.026	-0.014	0.021	-0.011	0.011	0.016	0.02
	Harvesting	Male Fee Estimate Std. Error Estimate 0.003 0.004 0.01*** 0 0 0*** 0.052 0.031 0.033 0.009 0.017 0.029* 5 0.085*** 0.024 -0.037 0.024 0.048 -0.061* -0.005 0.026 -0.014 0.042 0.024 -0.038* -0.005 0.015 0.006 -0.075*** 0.014 -0.09*** 0.035 0.019 0.012 0.127*** 0.029 0.047 -0.057* 0.027 -0.003 1.972*** 0.073 1.748*** 0.15 0.223 521	0.019	-0.004	0.008	0.035*	0.017		
Cropping Pattern	Paddy	-0.005	0.015	0.006	0.013	0.001	0.005	-0.016	0.01
Type of Wage Contract	Daily wage contract	-0.075***	0.014	-0.09***	0.012	-0.096***	0.007	-0.024*	0.012
Land Ownership	0 to 1 hectare	0.035	0.019	Female Male Estimate Std. Error Estimate Std. Error 0.01^{***} 0.002 -0.006^{**} 0.002 0^{***} 0 0^{**} 0 0.033 0.017 0.034^* 0.016 0.029^* 0.014 0.015^* 0.007 -0.037 0.023 -0.002 0.008 -0.061^* 0.026 -0.005 0.013 -0.014 0.021 -0.011 0.011 -0.038^* 0.019 -0.004 0.008 0.006 0.013 0.001 0.005 -0.09^{***} 0.012 -0.096^{***} 0.007 0.012 0.014 0.014^{**} 0.007 0.047 0.029 0.031^{***} 0.006 -0.003 0.013 0.006 0.007 1.748^{***} 0.053 2.11^{***} 0.03^2 0.223 0.137 826 1848	0.005	0.041***	0.01		
Land Ownership	Above 1 hectare	0.127***	0.029	0.047	0.029	0.031***	0.008	0.087***	0.017
Non-Agricultural Work	Both Agriculture and Non- Agriculture Participation	-0.057*	0.027	-0.003	0.013	0.006	0.007	0.014	0.014
Constant		1.972***	0.073	1.748***	0.053	2.11***	0.034	2.051***	0.061
R-squared		0.15		0.223		0.137		0.126	
Ν		521		826		1848		514	

Appendix Table 4 Summary of regression analysis of wage earning by sex in Kalmandasguri and Panahar, West Bengal

Notes: Significance. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

		Alabujanhalli					
Groups	Variables	Ν	Iale	Female			
		Estimate	Std. Error	Estimate	Std. Error		
	Age	-0.012***	0.002	-0.009**	0.003		
Individual Characteristics	Age_Sq	0***	0	0**	0		
	Married	0.027	0.015	0.002	0.012		
Household Characteristics	SC/ST/Muslim	-0.042***	0.008	0.071***	0.011		
	Land Preparation/Nursery/Irrigation/Other operations	0.029	0.019	0.011	0.02		
Crop Operations	Sowing	0.002	0.026	0.03	0.03		
	Weeding	0.007	0.024	0.014	0.018		
	Harvesting	0.019	0.019	0.04*	0.017		
Cropping Pattern	Paddy	0.013	0.008	0.009	0.01		
Type of Wage Contract	Daily wage contract	0.059**	0.02	-0.14***	0.017		
Land Ormanikia	0 to 1 hectare	0.032***	0.008	0.041***	0.01		
Land Ownership	Above 1 hectare	0.05	0.033	-0.009	0.032		
Non-Agricultural Work	Both agricultural and non-agricultural participation	-0.05***	0.009	-0.107***	0.015		
Constant		2.331***	0.052	2.216***	0.055		
R-squared		0.117		0.274			
Ν		1386		533			

Appendix Table 5 Summary of regression analysis of wage earning by sex in Alabujanahalli, Karnataka

Notes: Significance. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

			Ven	mani		Palakurichi			
Groups	Variables	М	ale	Fer	nale	М	ale	Fei	male
		Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
T 1 1 1	Age	0.004	0.003	0	0.003	0	0.002	-0.003*	0.001
Individual Characteristics	Age_Sq	0	0	0	0	0	0	0**	0
	Married	-0.04	0.024	-0.012	0.014	-0.021	Palakurichi Male Fen te Std. Error Estimate 0.002 -0.003* 0 0 0** 1 1 0.02 0.008 4 0.009 0.024* 8 0.012 NA *** 0.025 -0.003 2 0.011 0.004 0.063 0.003 7 0.014 -0.21*** * 0.006 0.006 0.039 -0.02 3 0.014 -0.007 -0.02 ** 0.076 2.293*** 3 0.295 459	0.004	
Household Characteristics	SC/ST/Muslim	-0.008	0.011	0.007	0.011	0.004	0.008	-0.002	0.005
	Land Preparation/Nursery/Irrigatio n/Other operations	0.027	0.016	-0.027	0.02	0.017	0.009	0.024*	0.01
Crop Operations	Sowing	-0.019	0.02	0.024	0.033	-0.008	0.012	NA	NA
	Weeding	-0.11**	0.042	-0.007	0.012	-0.156***	0.025	-0.003	0.003
Cropping Pattern	Harvesting	-0.056**	0.018	-0.01	0.017	0.022	0.011	0.004	0.006
Cropping Pattern	Paddy	0.002	0.014	-0.011	0.016	0.031	0.063	0.003	0.018
Type of Wage Contract	Daily wage contract	0.099***	0.014	0.017	0.018	0.027	0.014	-0.21***	0.017
Land Ownership	0 to 1 hectare	0.001	0.011	0.012	0.01	0.013*	0.006	0.006	0.004
	Above 1 hectare	0.014	0.031	0.019	0.024	0.05	0.039	Palakurichi Fen td. Error Estimate 0.002 -0.003* 0 0** 0.02 0.008 0.009 0.024* 0.012 NA 0.025 -0.003 0.011 0.004 0.063 0.003 0.014 -0.21**** 0.005 -0.002 0.014 -0.007 0.015 -0.007	0.014
Non-Agricultural Work	Both agricultural and non- agricultural participation	0.065***	0.018	0.043	0.024	0.023	0.014	-0.007	0.009
Constant		2.144***	0.068	2.008***	0.071	2.281***	0.076	2.293***	0.038
R-squared		0.166		0.035		0.168		0.295	
Ν		551		544		508		459	

Appendix Table 6 Summary of regression analysis of wage earning by sex in Venmani and Palakurichi, Tamil Nadu

Notes: Significance. codes: 0 **** 0.001 *** 0.01 ** 0.05 *. 0.1 * 1

		Hakamwala					
Groups	Variables	Μ	ale	Female			
		Estimate	Std. Error	Estimate	Std. Error		
	Age	0.004**	0.002	0.006	0.005		
Individual Characteristics	Age_Sq	0***	0	0	0		
	Married	$\begin{tabular}{ c c c c c c } \hline Hakamwala & Female & Female \\ \hline \hline Male & Female & Std. Error & Estimate & Std. E \\ \hline 0.004^{**} & 0.002 & 0.006 & 0.00 \\ 0^{***} & 0 & 0 & 0 \\ 0.007 & 0.011 & -0.039 & 0.02 \\ \hline 0.005 & 0.009 & 0.075^{**} & 0.02 \\ \hline 0.005 & 0.009 & 0.075^{**} & 0.02 \\ \hline erations & -0.041^{*} & 0.021 & -0.055 & 0.17 \\ -0.026 & 0.032 & NA & NA \\ -0.059^{**} & 0.023 & -0.179^{*} & 0.07 \\ 0.021 & 0.02 & -0.1 & 0.06 \\ \hline 0.026^{**} & 0.009 & 0.019 & 0.06 \\ \hline 0.014 & 0.007 & 0.061^{**} & 0.02 \\ \hline 0.014 & 0.007 & 0.061^{**} & 0.02 \\ \hline 0.014 & 0.007 & 0.026 & 0.02 \\ \hline 0^{*} & 0 & 0 & 0 \\ \hline 1.985^{***} & 0.034 & 1.881^{***} & 0.10 \\ \hline 0.17 & 0.101 \\ \hline 1530 & 558 \\ \hline \end{tabular}$	0.03				
Household Characteristics	SC/ST/Muslim	0.005	0.009	0.075**	0.028		
	Land Preparation/Nursery/Irrigation/Other operations	-0.041*	0.021	-0.055	0.175		
Crop Operations	Sowing	-0.026	0.032	NA	NA		
Crop Operations	Weeding	-0.059**	0.023	-0.179*	0.073		
	Harvesting	0.021	0.02	-0.1	0.069		
Cropping Pattern	Paddy	0.026**	0.009	0.019	0.064		
Type of Wage Contract	Daily wage contract	-0.151***	0.01	-0.057	0.031		
Land Ownership	0 to 1 hectare	0.014	0.007	0.061**	0.021		
Land Ownership	Above 1 hectare	0.075	Hakamwala Male Fema Estimate Std. Error Estimate 0.004^{**} 0.002 0.006 0^{***} 0 0 -0.007 0.011 -0.039 0.005 0.009 0.075^{**} -0.041^{*} 0.021 -0.055 -0.026 0.032 NA -0.059^{**} 0.023 -0.179^{*} 0.021 0.02 -0.1 0.026^{**} 0.009 0.019 0.151^{***} 0.01 -0.057 0.014 0.007 0.061^{**} 0.075 0.053 0.11 0.027^{***} 0.007 0.026 0^{*} 0 0 1.985^{***} 0.034 1.881^{***} 0.17 0.101 1530 558	0.07			
NI A 1 W/	Both agricultural and non-agricultural participation	0.027***	0.007	0.026	0.023		
Inon-Agricultural work	MGNREGS Days	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0				
Constant		1.985***	0.034	1.881***	0.103		
R-squared		0.17		0.101			
Ν		1530		558			

Appendix Table 7 Summary of regression analysis of wage earning by sex in Hakamwala, Punjab

Notes: Significance. codes: 0 **** 0.001 *** 0.01 ** 0.05 *. 0.1 * 1