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Rural Employment Scheme and Agricultural Wage Rate Nexus: An Analysis across States[§]

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Abstract

This paper on Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) has covered two objectives; one, whether the introduction of MGNREGS has increased the wage rates for agricultural labourers across the states and two, if so what are the factors that determine the growth rate of wages for farm labourers. The study is based on the secondary data on farm wages published by the Labour Bureau of India by gender and farm operation across the states and has covered the period 2000-01 to 2010-11. To present a comparative picture, the study period has been divided into two sub-periods, viz. pre-MGNREGS (2000-01 to 2005-06) and post-MGNREGS (2005-06 to 2010-11). The study has shown that the real wage rates have increased substantially during post-MGNREGS period as compared to pre-MGNREGS period for both male and female agricultural labourers in all the major farming operations. The rate of increase in wage rates has been found to be higher across the female agricultural labourers as compared to their male counterparts. The regression analysis has suggested that the average days of employment per household by MGNREGS, productivity of foodgrains, and road density have positively fuelled the growth rate of wages for both male and female farm labourers.

Key words: MGNREGS, rural employment, agricultural wages, male labourers, female labourers, rural India

JEL Classification: J43, J48, I28, I38

Introduction

Assured wage rate and employment opportunities are the important determinants of rural poverty in India. In improving the purchasing power of the rural people living below poverty line, both assured wage rate and improved employment opportunities help them to cross the poverty barriers in a sustained manner. Keeping

this in view, the Government of India in 2006 introduced a novel assured employment scheme called the National Rural Employment Guarantee Scheme, latter renamed as Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). Close to ₹ 2 lakh crore has been spent on this programme which has generated an amount of 1348 crore person days of employment throughout India since its inception (MoRD, 2012 cited by Gulati *et al.*, 2013). With the major objectives of right to work and assured employment, the MGNREGS is aiming to reduce the migration of rural poor and rural poverty among the vulnerable sections by improving their standard of living. While the evidence is lacking on the exact

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quantum of reduction of rural poverty due to the introduction of MGNREGS, the studies carried out on the impact of this scheme have shown that it does help in getting the assured wage rate and employment in most of the states where it is being implemented effectively (*see*, Shah, 2009; Mukherjee and Sinha, 2011; Dutta *et al.*, 2012; MoRD, 2012; Mann and Ramesh, 2013).

Although this employment scheme was introduced specifically to improve the standard of living of the vulnerable sections of the rural population, it is increasingly argued that this employment scheme has been seriously affecting the growth of agricultural sector, which has been passing through a serious crisis since early-1990s because of increased cost of cultivation and poor remuneration from crop cultivation (*see*, Harish *et al.*, 2011; Narayanamoorthy and Alli, 2012; 2013; Gulati *et al.*, 2013). It is argued that since this scheme remains functional throughout the year including the busy seasons of agriculture, it has created unusual labour scarcity in the rural areas which has resulted in a steep increase in the wage rate of agricultural labourers (Shah, 2009; Dutta *et al.*, 2012; Berg *et al.*, 2012; Gulati, 2013). The introduction of MGNREGS has also reportedly deteriorated the quality of labour considerably, meaning that the effective working hours of labour have been reduced which is ultimately increasing the labour requirement for the given operation (Verma and Shah, 2012). Both the increased wage rate and requirement of labour have reportedly increased the cost of cultivation of different crops substantially since the introduction of MGNREGS (Chandrasekar and Ghosh, 2011). As the output prices are not fixed in consonance with the rise in cost of cultivation in India, the losses from crop cultivation have reportedly increased for farmers. Importantly, citing increased wage rate due to MGNREGS in agriculture, the farmers belonging to fertile region of Andhra Pradesh had even declared 'paddy crop holiday' in a large area during *kharif* 2011 (*see*, GOAP, 2011; Narayanamoorthy and Alli, 2012).

Given the wide variation in irrigation coverage and other factors governing the wage rate in agriculture, is it correct to say that the MGNREGS is increasing wage rate and deteriorating quality of labour supply uniformly across the states in India? Even if one accepts the argument that MGNREGS increases the wage rate in agriculture, will its impact on wage rate be the same

across high and low irrigated states? Quite a few studies have analysed the implementation, equity and governance aspects of MGNREGS after the implementation this scheme (Aiyar and Samji, 2006; Bhatia and Dreze, 2006; Chakraborty, 2007; Gopal, 2009, Khera and Nayak, 2009; Adhikari and Bhatia, 2010; Jha, *et al.*, 2009, 2011; Imbert and Papp, 2011; Liu and Barrett, 2013). But not many detailed studies are available as to what happened to the wage rate of agricultural labourers for both males and females after the introduction of MGNREGS covering all the major states of India. Studies are also seldom available on the operation-wise wage rate for agricultural labourers after the introduction of the rural employment scheme.

Another issue which has not been studied by the researchers is that if the agricultural wages are being increased due to MGNREGS, what are the factors responsible for the increased wage rate? Given the absence of detailed macro-level data based studies, one cannot come to a conclusion that MGNREGS has uniformly increased the wage rate. Moreover, the surplus labour available is less in the irrigated regions as compared to un-irrigated regions and therefore, the impact of MGNREGS on wage rate will not be the same between these two regions. Since the irrigation coverage to cropped area, cropping pattern, intensity of crop cultivation, availability of labour and rural infrastructure facilities widely vary from one state to another, the impact of MGNREGS on wage rate may not be the same across the states. Keeping this in view, this paper has studied the impact of MGNREGS on the wage rate of agricultural labourers utilizing the state-wise data. The specific objectives of the study are:

- To study the farm wage rate by gender and operation before and after the introduction of MGNREGS across different states in India,
- To find out the growth rate of real agricultural wages before and after the introduction of MGNREGS across different states of India, and
- To evaluate the factors contributing to the growth rate of real agricultural wages after the introduction of MGNREGS.

Data and Method

The study is based on secondary data and covers the period 2000-01 to 2010-11. Since MGNREGS was

effectively introduced from 2006-07 onwards, the study period has been divided into two sub-periods, namely pre-MGNREGS period (2000-01 to 2005-06) and post-MGNREGS period (2005-06 to 2010-11) to capture its impact on wage rate. The study has covered 14 major states of India, which together accounted for about 95 per cent of the cropped area during 2010-11. State-wise wage data for agricultural labour by gender and operation, published by the Labour Bureau, Ministry of Labour and Employment, Government of India, for various years have been used for the analysis. To find the growth in wage rate of agricultural labourers after the introduction of rural employment scheme, all the money wage related data were converted into real wage using the consumer price index for agricultural labourers (CPIAL) with the base year 1986-87. The state-wise real wage data for agricultural labour were available in Usami (2011), which was used for the analysis in the present study.

While studying the growth rate of real wages in various operations among male and female wage labours in agriculture, we also aimed to identify the factors that are responsible for the increased wage rate, particularly after the introduction of rural employment scheme. For this, a total of six important variables were identified to relate with growth rate of real farm wage. They were ADEPH (average days of employment per household generated by MGNREGS), GCABPL (gross cropped area per thousand of rural population living below poverty line), PFG (productivity of foodgrains), ROAD (rural road density in each state), GIAGCA (percentage of irrigated area to cropped area), and ELEC (percentage of villages having electricity supply). These six variables have, one way or the other, some relationship with the wage rate determination. Any sudden increase in employment availability is expected to increase the wage rate in any normal rural setting. Studies as well as available data have confirmed that the introduction of rural employment scheme has created additional employment for the labourers and therefore, it is expected to have a positive impact on the growth rate of wages in any given region. In view of this, the variable ADEPH was included to relate with growth rate of real wages in the analysis. The supply of labour in a region is also an important factor in determining the wage rate. Information available from different parts of the country has indicated that this rural employment scheme has altered the supply of labour in the rural areas. In order to reflect the supply

of labour in our analysis, the variable GCABPL was included in the analysis. As most of the people living below poverty line are also agricultural labourers in the rural areas, the gross cropped area of each state was divided with its rural population living below poverty line to reflect the supply of labour.

States that have higher productivity are generally well developed in terms of agriculture where the farm wage rate is also higher. In order to reflect agricultural development in a state, the productivity of foodgrains (PFG) was included in the analysis. It is a well-known fact that irrigation influence on farm wage rate is very significant as the agricultural growth and irrigation development are closely correlated in India (*see*, Dhawan, 1988). Therefore, the variable percentage of irrigation to cropped area (GIAGCA) was included in the analysis to relate with the growth rate of farm wage. The availability of rural infrastructures is considered to be an important factor not only in determining the agricultural development but also in controlling the farm wage rate and rural poverty (*see*, Fan *et al.*, 1999). In view of this, two important rural infrastructure variables, namely the rural road density (ROAD) and the percentage of villages having rural electrification (ELEC) were also used in the analysis to relate them with the growth in farm wage rate. These two were used as the lagged variables in the regression analysis since the rural infrastructure do not impact instantaneously on the growth rate of real agricultural wages. The variables used in this paper, their definitions, averages and range are presented in Table 1.

To find the growth rate of real wages by gender and operations across the states after the introduction of rural employment scheme, compound growth rate for the real farm wage was computed utilising the data of different states. The study also indentified the factors that were controlling the wage rate by employing the following four sets of equations or regression models:

$$\text{GWRML} = a + b_1 \text{ADEPH} + b_2 \text{GCABPL} + b_3 \text{PFG} + b_4 \text{ROAD} + b_5 \text{GIAGCA} + b_6 \text{ELEC} \dots(1)$$

$$\text{GWRFL} = a + b_1 \text{ADEPH} + b_2 \text{GCABPL} + b_3 \text{PFG} + b_4 \text{ROAD} + b_5 \text{GIAGCA} + b_6 \text{ELEC} \dots(2)$$

$$\text{GWRHM} = a + b_1 \text{ADEPH} + b_2 \text{GCABPL} + b_3 \text{PFG} + b_4 \text{ROAD} + b_5 \text{GIAGCA} + b_6 \text{ELEC} \dots(3)$$

Table 1. Different variables used in the study for analysis

Variable	Description of variable	Average	Standard deviation	Maximum	Minimum
GCABPL	Gross cropped area per thousand rural population living below poverty line in 2009-10 (ha)	1167	760	3137	150
PFG	Productivity of foodgrains in 2009-10 (kg/ha)	2046	923	4144	931
GIAGCA	Percentage of gross irrigated area to gross cropped area in 2009-10 (%)	49.99	24.54	98.00	17.10
ADEPH	Average of person days per household from 2008-09 to 2010-11 (days)	43.44	10.34	62.12	27.21
GWRPMLB	Growth rate of wage for ploughing male labour before MGNREGS (%)	-0.25	1.67	2.50	-2.71
GWRPMLA	Growth rate of wage for ploughing male labour after MGNREGS (%)	3.11	2.72	8.65	-1.84
GWRHMLB	Growth rate of wage for harvesting male labour before MGNREGS (%)	0.07	1.59	2.78	-3.81
GWRHMLA	Growth rate of wage for harvesting male labour after MGNREGS (%)	3.63	2.56	8.18	-1.60
GWRNFLB	Growth rate of wage for transplanting female labour before MGNREGS (%)	-0.34	2.36	4.63	-4.29
GWRNFLA	Growth rate of wage for transplanting female labour after MGNREGS (%)	3.04	3.69	11.44	-2.02
GWRWFLB	Growth rate of wage for weeding female labour before MGNREGS (%)	-0.37	2.28	3.70	-6.37
GWRWFLA	Growth rate of wage for weeding female labour after MGNREGS (%)	3.20	3.26	10.98	-2.42
GWRHFLB	Growth rate of wage for harvesting female labour before MGNREGS (%)	0.26	1.91	3.28	-3.74
GWRHFLA	Growth rate of wage for harvesting female labour after MGNREGS (%)	3.53	2.64	9.12	-1.57
GWRMLB	Growth rate of wage for male labour before MGNREGS (%)	-0.10	1.45	2.77	-2.72
GWRMLA	Growth rate of wage for male labour after MGNREGS (%)	3.08	2.45	9.00	-1.49
GWRFLB	Growth rate of wage for female labour before MGNREGS (%)	-0.13	1.87	3.61	-4.10
GWRFLA	Growth rate of wage for female labour after MGNREGS (%)	3.29	2.77	10.46	-1.15
TMRWR	Total male real wage rate at (1986-87 prices) (₹)	21.86	8.90	59.53	12.98
TFRWR	Total female real wage rate at (1986-87 prices) (₹)	16.38	5.52	32.37	9.90
ELEC	Percentage of village electrified in 1990-91 (%)	88.35	12.72	100.00	66.76
ROAD	Road density per 1000 km ² in rural India in 1990-91 (km)	6725	3925	14488	1707

Sources: Computed using Usami (2011); Labour Bureau Website (www.labourbureau.gov.in)
Bhalla and Singh (2012); GoI (2012); Fan *et al.* (1999).

$$\text{GWRHF} = a + b_1 \text{ADEPH} + b_2 \text{GCABPL} + b_3 \text{PFG} + b_4 \text{ROAD} + b_5 \text{GIAGCA} + b_6 \text{ELEC} \dots(4)$$

The dependent variable used in Equation (1) refers to the growth rate of average wage for male agricultural labourers during post-MGNREGS period (GWRML) and in Equation (2) to the growth rate of average wage for female agricultural labourers during post-MGNREGS period. The dependent variable in Equation (3) is GWRHM which refers to the growth rate of wage for male agricultural labourers in harvesting operation during post-MGNREGS period. The growth rate in wages for female agricultural labourers in harvesting operation is the dependent variable in Equation (4). Since the farm wage rate varies generally by operation, the factors that determine the wage rate were studied by taking an important operation, namely harvesting along with the growth rate of average farm wage.

Results and Discussion

An important issue that is being debated today is that the rural employment scheme introduced in the year 2006 has increased the wage rates for different agricultural operations. Utilising data from cost of

cultivation survey in different crops, some of the studies have shown that the farm wage rate has increased substantially due to the introduction of rural employment scheme (see, Narayanamoorthy and Alli, 2013; Gulati *et al.*, 2013). Some questions that arise are: Is it correct to say that the rural employment scheme has increased the farm wage rate in India? If yes, is it true across all the states and operations? Is the increase of wage rate same for both male and female agricultural labourers? An attempt is made in this section to answer these questions.

Growth Performance of Farm Wage Rate

As revealed by some earlier studies, our study has also shown that the farm wage rate for male labourers has increased considerably after the introduction of employment scheme (see, Table 2). At the all-India level, the average real wage rate for male agricultural labourers has increased from ₹ 18.93/day in 2000-01 to ₹ 19.28/day in 2005-06 and then to ₹ 22.25/day in 2010-11. That is, the wage rate grew at a rate of only 0.31 per cent per annum for male labourers during pre-MGNREGS period, whereas it registered a growth rate of 2.42 per cent per annum during post-MGNREGS period at the all-India level. This trend is not only true

Table 2. Growth rate of real wages for male agricultural labour by states

(at 1986-87 prices)

State	Real wage rate of male (₹/day)			Growth rate (per cent/annum)	
	2000-01	2005-06	2010-11	Pre-NREGS	Post-NREGS
Andhra Pradesh	15.05	16.03	26.88	1.05	9.00
Bihar	16.00	17.00	19.35	1.02	2.18
Gujarat	16.63	17.43	15.93	0.79	-1.49
Haryana	26.05	25.78	30.33	-0.18	2.75
Karnataka	16.98	16.28	19.35	-0.70	2.93
Kerala	48.10	47.88	59.53	-0.08	3.70
Madhya Pradesh	14.38	14.23	15.13	-0.17	1.03
Maharashtra	18.88	17.18	20.08	-1.56	2.63
Odisha	14.45	17.03	22.85	2.77	5.03
Punjab	24.53	22.75	29.58	-1.24	4.47
Rajasthan	27.08	22.95	24.80	-2.72	1.30
Tamil Nadu	25.53	23.38	31.35	-1.46	5.01
Uttar Pradesh	17.75	16.75	20.38	-0.57	3.40
West Bengal	18.60	20.45	21.88	1.59	1.13
All-India	18.93	19.28	22.25	0.31	2.42

Sources: Computed using Usami (2011); Labour Bureau Website (www.labourbureau.gov.in)

at the national level, but has also turned out to be correct in most of the states considered for the analysis. For instance, of the 14 major states considered for the analysis, the wage rate registered a negative growth in 9 states during pre-MGNREGS period. Even in the developed states like Punjab, Tamil Nadu and Maharashtra, the real wage rate for male agricultural labourers had declined sharply before the introduction of employment scheme. But, this trend has dramatically changed during 2005-06 to 2010-11 in all the states, except in Gujarat and West Bengal. While the wage rate declined at the rate of 1.49 per cent in Gujarat which is considered to be high economic growth state in India, it had decelerated at the rate of 1.13 per cent in West Bengal after the introduction of employment scheme.

The growth in real wage rate for male has been found very impressive in states like Andhra Pradesh (9.0%), Odisha (5.0%), Tamil Nadu (5.0%), Punjab (5.0%), Kerala (3.7%) and Uttar Pradesh (3.4%), where no miracle has taken place in the agricultural sector in terms of growth and productivity of crops during post-MGNREGS period. This increased growth rate of real agricultural wages for male labour could be mainly due to the introduction of MGNREGS. The statistical

significance of this can be assessed by regression analysis which is attempted in the next section of this paper.

In almost all the states in India, the wages paid for female farm labourers are generally low as compared to their male counterparts even for the same operation. In our study, the growth scenario of real wage rate for female agricultural labourers has been found different from the one which is observed for their male counterparts across the states. The data reported in Table 3 show that the wage rate has increased at a faster rate for female than male labourers during post-MGNREGS period. The real wage rate for female farm labourers was ₹ 14.53/day in 2000-01 which remained almost same in 2005-06, but increased to ₹ 17.47/day in 2010-11 at the all-India level. In terms of growth, the wage rate grew only at a rate of 0.03 per cent during pre-MGNREGS period, whereas it registered a growth rate of 3.11 per cent per annum for female labourers during post-MGNREGS period, which is much higher than the growth rate of male wages (2.42% per annum). Since wages are paid for female labourers on par with the male labourers under the MGNREGS, it must have helped to increase the wage rate at a faster pace for female labourers.

Table 3. Growth rate of real wages for female agricultural labour by states

(at 1986-87 prices)

State	Real wage rate (₹/day)			Growth rate (per cent/annum)	
	2000-01	2005-06	2010-11	Pre-MGNREGS	Post-MGNREGS
Andhra Pradesh	10.80	10.90	19.80	0.15	10.46
Bihar	13.37	14.57	16.47	1.44	2.06
Gujarat	14.43	14.87	13.87	0.49	-1.15
Haryana	21.90	24.60	29.20	1.96	2.90
Karnataka	11.97	11.43	13.03	-0.76	2.21
Kerala	29.40	29.27	31.77	-0.08	1.38
Madhya Pradesh	11.73	11.43	13.33	-0.43	2.60
Maharashtra	12.20	10.83	13.30	-1.96	3.48
Odisha	11.80	14.60	18.40	3.61	3.93
Punjab	23.47	22.13	29.10	-0.97	4.67
Rajasthan	20.70	16.10	17.63	-4.10	1.53
Tamil Nadu	13.50	12.90	19.03	-0.75	6.70
Uttar Pradesh	15.13	13.77	17.43	-1.57	4.01
West Bengal	15.30	16.37	17.67	1.13	1.28
All-India	14.53	14.53	17.47	0.03	3.11

Sources: Computed using Usami (2011); Labour Bureau Website (www.labourbureau.gov.in)

The state-wise scenario in terms of growth rate of wages for female labourers has been found almost the same as for the male labourers. For instance, 8 out of 14 states had registered a negative growth rate in female wage rate during pre-MGNREGS period, which is almost the same for male wage rate as well. Similarly, except Gujarat, all others states have registered a positive growth in female wage rate during post-MGNREGS period which is exactly matching with the growth rate of wage for male farm labourers. Not only this, our growth analysis has further shown that all those states which have registered high growth rate in male wages in post-MGNREGS period, have also recorded high growth rate in female wage rate during this period. The states like Andhra Pradesh and Tamil Nadu have registered a high growth rate in male wage which is also same for female wage rate also in post-MGNREGS period. On the whole, the analysis has shown that not only the average wage rate for male and female agricultural labourers has increased considerably in the post-MGNREGS period across the states, except Gujarat and West Bengal, but the pattern of growth rate in farm wage is also the same for both male and female labourers across the states.

Operation-wise Wage Growth Performance

Farm wages in India not only vary from male to female labourers but also widely vary from one operation to another in all major crops and in all states. Therefore, we have studied the operation-wise wage rate for male and female labourers during pre- and post-MGNREGS periods. Based on data availability, we have considered four important operations, namely ploughing, sowing, transplanting and harvesting for male labourers and weeding, transplanting and harvesting for female labourers for this analysis. As followed earlier, growth rates of real wage were computed separately for pre-MGNREGS period (2000-01 to 2005-06) and post-MGNREGS period (2005-06 to 2010-11) to assess the impact of the rural employment scheme on operation-wise wage rate.

The data on operation-wise wage rate for male labourers across the states, presented in Tables 4, 5, 6 and 7 show that the wage rate for male labourers has increased substantially for all the four operations after the introduction of rural employment scheme. Among the four operations, the wage rate has registered the highest growth in ploughing operation (2.84 % per

Table 4. State-wise growth rate of real wages in ploughing for male agricultural labourers during pre- and post-MGNREGS periods

(at 1986-87 prices)

State	Real wage rate (₹/day)			Growth rate (per cent/annum)	
	2000-01	2005-06	2010-11	Pre-MGNREGS	Post-MGNREGS
Andhra Pradesh	17.60	18.30	30.10	0.65	8.65
Bihar	17.00	18.30	22.90	1.24	3.81
Gujarat	18.90	20.90	18.70	1.69	-1.84
Haryana	26.40	24.70	30.70	-1.10	3.69
Karnataka	18.30	17.90	21.20	-0.37	2.86
Kerala	59.40	59.20	70.70	-0.06	3.00
Madhya Pradesh	14.50	14.70	15.80	0.23	1.21
Maharashtra	19.80	17.70	21.50	-1.85	3.29
Odisha	15.90	17.60	24.40	1.71	5.60
Punjab	25.00	22.20	30.70	-1.96	5.55
Rajasthan	27.30	23.60	23.00	-2.40	-0.43
Tamil Nadu	37.50	31.80	42.20	-2.71	4.83
Uttar Pradesh	18.40	17.20	20.70	-1.12	3.14
West Bengal	23.80	27.60	27.80	2.50	0.12
All-India	21.50	21.30	25.20	-0.16	2.84

Sources: Computed using Usami (2011); Labour Bureau Website (www.labourbureau.gov.in)

Table 5. State-wise growth rate of real wages for sowing for male agricultural labourers during pre- and post-MGNREGS periods

(at 1986-87 prices)

State	Real wage rate (₹/day)			Growth rate (per cent/annum)	
	2000-01	2005-06	2010-11	Pre-MGNREGS	Post-MGNREGS
Andhra Pradesh	14.30	15.50	24.70	1.35	8.08
Bihar	16.60	17.20	19.50	0.59	2.11
Gujarat	17.90	18.70	16.60	0.73	-1.97
Haryana	25.00	25.50	29.20	0.33	2.28
Karnataka	17.10	14.80	19.50	-2.38	4.70
Kerala	52.90	51.70	62.20	-0.38	3.13
Madhya Pradesh	14.30	13.80	15.00	-0.59	1.40
Maharashtra	17.70	16.60	19.80	-1.06	2.98
Odisha	13.80	16.90	22.20	3.44	4.65
Punjab	25.00	22.20	27.90	-1.96	3.88
Rajasthan	28.00	24.20	24.30	-2.40	0.07
Tamil Nadu	22.60	21.00	27.90	-1.22	4.85
Uttar Pradesh	17.90	16.50	20.50	-1.35	3.68
West Bengal	16.70	18.10	19.80	1.35	1.51
All-India	19.30	19.20	21.80	-0.09	2.14

Sources: Computed using Usami (2011); Labour Bureau Website (www.labourbureau.gov.in)

Table 6. State-wise growth rate of real wages for transplanting for male agricultural labourers during pre- and post-MGNREGS periods

(at 1986-87 prices)

State	Real wage rate (₹/day)			Growth rate (per cent/annum)	
	2000-01	2005-06	2010-11	Pre-MGNREGS	Post-MGNREGS
Andhra Pradesh	14.10	14.70	27.70	0.70	11.14
Bihar	15.10	15.80	17.30	0.76	1.52
Gujarat	13.70	14.10	13.60	0.48	-0.60
Haryana	26.10	25.40	31.20	-0.45	3.49
Karnataka	16.30	16.60	16.70	0.30	0.10
Kerala	52.90	51.70	62.20	-0.38	3.13
Madhya Pradesh	14.90	14.80	14.10	-0.11	-0.80
Maharashtra	20.70	18.20	19.60	-2.12	1.24
Odisha	14.10	17.10	22.80	3.27	4.91
Punjab	24.20	22.60	28.90	-1.13	4.18
Rajasthan	28.00	24.20	24.30	-2.40	0.07
Tamil Nadu	19.90	20.40	27.40	0.41	5.04
Uttar Pradesh	17.00	16.20	19.40	-0.80	3.05
West Bengal	17.00	18.30	20.10	1.24	1.58
All-India	17.10	18.40	20.80	1.23	2.06

Sources: Computed using Usami (2011); Labour Bureau Website (www.labourbureau.gov.in)

Table 7. State-wise growth rate of real wages for harvesting for male agricultural labourers during pre- and post-MGNREGS periods

(at 1986-87 prices)

State	Real wage rate (₹/day)			Growth rate (percent/annum)	
	2000-01	2005-06	2010-11	Pre-MGNREGS	Post-MGNREGS
Andhra Pradesh	14.20	15.60	25.00	1.58	8.18
Bihar	15.30	16.70	17.70	1.47	0.97
Gujarat	16.00	16.40	14.80	0.41	-1.29
Haryana	26.70	27.50	30.20	0.49	1.57
Karnataka	16.20	15.80	20.00	-0.42	4.01
Kerala	27.20	28.90	43.00	1.02	6.85
Madhya Pradesh	13.80	13.60	15.60	-0.24	2.31
Maharashtra	17.30	16.20	19.40	-1.09	3.05
Odisha	14.00	16.50	22.00	2.78	4.91
Punjab	23.90	24.00	30.80	0.07	4.25
Rajasthan	25.00	19.80	27.60	-3.81	5.69
Tamil Nadu	22.10	20.30	27.90	-1.41	5.44
Uttar Pradesh	17.70	17.10	20.90	-0.57	3.40
West Bengal	16.90	17.80	19.80	0.87	1.79
All-India	17.80	18.20	21.20	0.37	2.58

Sources: Computed using Usami (2011); Labour Bureau Website (www.labourbureau.gov.in)

annum), followed by transplanting (2.06%), harvesting (2.58%) and sowing (2.14%) at the national level during post-MGNREGS period. In all these operations, the wage rate for male labour was either negative or very low during the pre-MGNREGS period at the national level.

Similar to the national level trend, the operation-wise growth rate of wage for male labourers across the states is also almost matching with the trend noted at the overall growth rate of wage. The growth rate of wage for male labourers has been found very high in agriculturally-developed states like Andhra Pradesh, Tamil Nadu and Punjab in all the four operations considered for the analysis during post-MGNREGS period. Similarly, in Gujarat, the negative growth rate in wage rate for male labourers for all the four operations tallies with their overall growth rate during post-MGNREGS period. However, the male wages have registered a negative growth rate for the ploughing operation in Rajasthan and for transplanting operation in Madhya Pradesh during post-MGNREGS period, which has not been observed in any other states considered for analysis.

The analysis on operation-wise wage rates for female labourers has also shown that the wages are significantly higher during post-MGNREGS period as compared to pre-MGNREGS period in all the three operations considered for analysis (*see*, Tables 8, 9 and 10). Among the three operations (weeding, transplanting and harvesting), the growth rate of wages has been found to be highest in weeding operation, followed by transplanting and harvesting at the national level. In the case of weeding operation, the wage grew at a rate of 3.25 per cent per annum during post-MGNREGS period as compared to -0.36 per cent per annum during pre-MGNREGS period. Female wage in transplanting operation has registered a growth rate of 3.07 per cent per annum during post-MGNREGS period as compared to its previous period growth rate of only 0.34 per cent. The same trend has been observed with the harvesting operation as well.

As observed in operation-wise wage rate for male labourers, the wage rate for female labourers has also registered an appreciable growth in all the three operations across all the states during post-MGNREGS period. In states like Andhra Pradesh, Punjab and Tamil

Table 8. State-wise growth rate of real wages for transplanting for female agricultural labourers during pre- and post-MGNREGS periods

(at 1986-87 prices)

State	Real wage rate (₹/day)			Growth rate (per cent/annum)	
	2000-01	2005-06	2010-11	Pre-MGNREGS	Post-MGNREGS
Andhra Pradesh	10.80	10.60	20.30	-0.31	11.44
Bihar	14.10	14.90	16.40	0.92	1.61
Gujarat	13.00	13.80	13.00	1.00	-0.99
Haryana	21.10	23.90	29.40	2.10	3.51
Karnataka	12.80	12.30	12.70	-0.66	0.53
Kerala	29.50	29.40	31.50	-0.06	1.16
Madhya Pradesh	12.00	11.80	13.10	-0.28	1.76
Maharashtra	14.10	12.40	13.00	-2.12	0.79
Odisha	11.80	14.80	21.10	3.85	6.09
Punjab	25.00	19.80	27.60	-3.81	5.69
Rajasthan	20.30	15.60	13.80	-4.29	-2.02
Tamil Nadu	13.10	11.90	18.60	-1.59	7.73
Uttar Pradesh	14.80	13.20	17.20	-1.89	4.51
West Bengal	15.40	16.90	17.70	1.56	0.77
All-India	14.80	15.10	18.10	0.34	3.07

Sources: Computed using Usami (2011); Labour Bureau Website (www.labourbureau.gov.in)

Table 9. State-wise growth rate of real wages in weeding for female agricultural labourers during pre- and post-MGNREGS periods

(at 1986-87 prices)

State	Real wage rate (₹/day)			Growth rate (per cent/annum)	
	2000-01	2005-06	2010-11	Pre-MGNREGS	Post-MGNREGS
Andhra Pradesh	10.00	9.90	18.50	-0.17	10.98
Bihar	12.30	13.20	16.30	1.18	3.58
Gujarat	14.90	15.30	14.50	0.44	-0.89
Haryana	21.10	23.10	28.70	1.52	3.68
Karnataka	11.50	10.90	12.70	-0.89	2.58
Kerala	31.50	29.50	31.30	-1.09	0.99
Madhya Pradesh	11.20	10.70	12.70	-0.76	2.90
Maharashtra	10.90	9.80	12.80	-1.76	4.55
Odisha	11.90	14.80	17.10	3.70	2.44
Punjab	24.20	22.60	28.90	-1.13	4.18
Rajasthan	20.30	15.60	13.80	-4.29	-2.02
TamilNadu	12.20	12.40	19.00	0.27	7.37
Uttar Pradesh	15.10	13.80	16.80	-1.49	3.33
West Bengal	15.00	15.90	17.40	0.98	1.51
All-India	14.00	13.70	16.60	-0.36	3.25

Sources: Computed using Usami (2011); Labour Bureau Website (www.labourbureau.gov.in)

Table 10. State-wise growth rate of real wages in harvesting for female agricultural labourers during pre- and post-MGNREGS periods

(at 1986-87 prices)

State	Real wage rate (₹/day)			Growth rate (per cent/annum)	
	2000-01	2005-06	2010-11	Pre-MGNREGS	Post-MGNREGS
Andhra Pradesh	11.60	12.20	20.60	0.84	9.12
Bihar	13.70	15.60	16.70	2.19	1.14
Gujarat	15.40	15.50	14.10	0.11	-1.57
Haryana	23.50	26.80	29.50	2.21	1.61
Karnataka	11.60	11.10	13.70	-0.73	3.57
Kerala	27.20	28.90	32.50	1.02	1.98
Madhya Pradesh	12.00	11.80	14.20	-0.28	3.13
Maharashtra	11.60	10.30	14.10	-1.96	5.37
Odisha	11.70	14.20	17.00	3.28	3.04
Punjab	21.20	24.00	30.80	2.09	4.25
Rajasthan	21.50	17.10	25.30	-3.74	6.75
Tamil Nadu	15.20	14.40	19.50	-0.90	5.18
Uttar Pradesh	15.50	14.30	18.30	-1.33	4.20
West Bengal	15.50	16.30	17.90	0.84	1.57
All-India	14.80	14.90	17.70	0.11	3.03

Sources: Computed using Usami (2011); Labour Bureau Website (www.labourbureau.gov.in)

Nadu, the growth rate of female wage rate is very significant in all the three operations, whereas Gujarat has consistently recorded a negative growth in all the three operations which is in consonance with the trend noted with male labour counterpart. On the whole, the growth analysis suggests that the rate of increase of real farm wages for both male and female labourers is substantially higher during post-MGNREGS period as compared to pre-MGNREGS period at the national level.

Factors Responsible for Farm Wage Growth – Regression Analysis

It is clear from the above growth analysis that the wage rate for farm labour grew at a very high rate during post-MGNREGS period. How has this happened? Which are the factors responsible for this fast rise in farm wage rate? What is the role of rural infrastructural factors like rural road density, rural electrification network, etc.? Irrigation development has been proved to be an important factor in determining the wage rate for farm labour in different regions in India (*see*, Narayanamoorthy and Deshpande, 2003; Narayanamoorthy and Bhattarai,

2004). Can the irrigation development be a responsible factor for the huge increase in the wage rate after the introduction of MGNREGS? What about the supply of rural labour in deciding the growth rate of farm wage? A few studies (Berg *et al.*, 2012; Gulati *et al.*, 2013) have already analysed the impact of MGNREGS on the wage rate, but they have not utilized the important supply-demand factors that determine the wage rate in their regression analysis. Moreover, studies have not analysed as to why have the wages increased at a faster rate in some states over others since the introduction of MGNREGS? Keeping this scenario in view, an attempt is made here to capture the factors that influence the growth rate of wage for farm labour by utilising six important variables, as reported in the methodology section. Four different regression models have been estimated by OLS method for studying the growth rate of wages for male and female farm labourers, as stated in the methodology section.

The regression results estimated using the growth rate of wage for male agricultural labourers as dependent variable have revealed that the variables used in the regression model are a good fit as the value of adjusted R² has been found to be 0.53 (*see*, Table 11).

Table 11. Regression results — Factors determining growth in wage rate for male and female labourers

Variable	Model (1)	Model (2)	Model (3)	Model (4)
ADEPH	0.213 (3.53) ^a	0.260 (3.60) ^a	0.260 (7.98) ^a	0.299 (5.15) ^a
GCABPL	0.000 (0.32) ^{ns}	0.000 (-0.19) ^{ns}	0.001 (2.34) ^c	0.001 (1.56) ^d
PFG	0.004 (3.16) ^a	0.003 (2.06) ^c	0.005 (7.38) ^a	0.002 (2.17) ^c
ROAD	0.000 (2.80) ^b	0.000 (2.26) ^c	0.000 (4.15) ^a	0.000 (2.08) ^c
GIAGCA	-0.079 (-2.07) ^c	-0.030 ^s (-0.66) ⁿ	-0.142 (-6.88) ^a	-0.056 (-1.52) ^d
ELEC	-0.087 (-1.44) ^d	-0.039 (-0.54) ^{ns}	-0.148 (-4.53) ^a	-0.109 (-1.87) ^d
Constant	-5.219 (-1.04) ^{ns}	-11.423 (-1.88) ^d	-0.711 (-0.26) ^{ns}	-5.708 (-1.19) ^{ns}
Adjusted R ²	0.530	0.460	0.874	0.626
D-W	1.842	1.932	2.481	2.063
N	14	14	14	14

Sources: Computed using Usami (2011); Labour Bureau Website (www.labourbureau.gov.in); Bhalla and Singh (2012); GoI (2012); Fan *et al.* (1999)

Notes: ^{a, b, c} and ^d are significant at 1 per cent, 5 per cent, 10 per cent and 20 per cent levels, respectively; ns-not significant; Figures within the parentheses are 't' values.

Of the six independent variables used in the model, five variables turned out to be significant in determining the growth rate of wage for male labourers. Of these, the variables ADEPH, PFG and ROAD have turned out to be positively significant, while GIAGCA and ELEC have shown a significant negative relationship with the growth rate of wage for male labourers. Any increase in employment opportunity in a region is expected to increase the wage rate because the supply of labour is inelastic in the short-run. This has exactly come out from our analysis.

The variable ADEPH (which is the average days of employment per household received from MGNREGS) suggests that one unit increase in days of employment would increase about 0.213 paise in the real wage rate for male labourers. The productivity of foodgrains (PFG) has depicted a positive influence on the growth rate of wage for male labourers. This was expected because the wage rate is generally higher in all those agriculturally-developed areas, where the demand for labour is already high. The employment scheme introduced in the year 2006 may have added more demand for labour in rural areas which might

have fuelled the growth rate of wages in these areas. Similarly, better road connectivity helps to enhance backward and forward linkages in the rural areas, which ultimately helps to increase the wage rate for rural labourers. Therefore, the variable ROAD has also turned out to be significant in increasing the wage rate in different states.

Irrigation availability is one of the key factors in determining the growth rate of labour wages in Indian agriculture. Therefore, it was expected that the variable GIAGCA would positively influence the growth rate of wages for male labourers. But, the irrigation variable has turned out to be negatively significant in our regression analysis. This could be possibly because the MGNREGS provides employment opportunities throughout the country, including the rainfed region, where the wage rate for farm labour traditionally was very low. Since this rural employment scheme provides better wage rate for labourers even in the rainfed region, the wage rate for farm labour may have increased at a faster rate because lower wages prevailed in this region. Our analysis has also shown that the wage rates have registered a high growth rate during post-MGNREGS

period in many of the states which have less irrigation facilities. Does this mean that the rural employment scheme discards the well established hypothesis of high growth rate of farm wage in irrigated region of India? More disaggregated studies comparing the irrigated and rainfed regions need to be carried out to find out whether the rural employment has increased the wage rate at a faster rate in the rainfed areas as compared to its counterpart.

Increased electrification helps to increase the economic activities in the rural areas, particularly by developing agriculture through groundwater irrigation development. Keeping this in view, the variable percentage of villages electrified (ELEC) was used in the regression model, which turned out to be negative in determining the growth rate of farm wage. As the employment is provided through MGNREGS even to the remote villages where the wage base is generally low, the variable ELEC would not have made a significant role in determining the growth rate of wage.

Similar to the regression model estimated for male labourers, separate regression was estimated for female labourers to find out the factors that were influencing the growth rate of wages using the same variables that were employed in the regression model of male labourers (Equation 2). In order to study as to what are the factors determining the operation-wise growth rate of wage for both male and female labourers, two separate regressions have been estimated considering the wage rate of harvesting operation of male and female labourers as dependent variables (Equations 3 and 4). The results of regression estimated by employing Equations (2), (3) and (4) are almost matching with the results generated for male agricultural labourers (*see*, Table 11).

On the whole, the regression analysis has suggested that the average days of employment per household given through MGNREGS appears to be the dominant factor in influencing the growth rate of farm wage for both male and female labourers after the introduction of rural employment scheme in India.

Conclusions and Suggestions

This paper has been studied with the following two major objectives: (a) whether the introduction of Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) has increased the

wage rates for agricultural labourers across the states, and (b) if so, what are the factors that determine the growth rate of wages for farm labourers. The data on farm wages published by the Labour Bureau of India by gender and farm-operations across the states covering the period 2000-01 to 2010-11 have been utilized for the study. Regression analysis has been carried out to find out the important factors that determine the growth rate of wages for male and female agricultural labourers. The study has shown that the real wage rates have increased substantially during post-MGNREGS period (2005-06 to 2010-11) as compared to pre-MGNREGS period (2000-01 to 2005-06) for both male and female agricultural labourers in all the major farming operations. The rate of increase in wage rates has been found to be higher across the female agricultural labourers as compared to their male counterparts.

The high growth rate in wages has not only been observed at the national level but has also been found in almost all the major states, except in the case of Gujarat and to some extent in West Bengal. While the Gujarat has registered a negative growth rate in wages for both male and female labourers, the growth of wage has decelerated in West Bengal, especially for male agricultural labourers after the introduction of MGNREGS. On the other hand, the growth rate in wages have increased at a very fast pace in agriculturally-developed states like Andhra Pradesh, Tamil Nadu and Punjab during post-MGNREGS period. The regression analysis has suggested that the average days of employment per household provided by MGNREGS, productivity of foodgrains, and road density have probably positively fuelled the growth rate of wages for both male and female farm labourers.

The negative growth in wage rate of farm labour registered in Gujarat state during post-MGNREGS period despite clocking high economic growth over the past few years needs further studies. Similarly, the growth rates of wages are more or less the same during pre- and post-MGNREGS periods in West Bengal, where pro-poor policies are being followed for years. Disaggregated district level studies particularly in these two states need to be carried out to find out the reasons for poor growth rate of wages for farm labour even after the introduction of MGNREGS. Although the increased growth in wage rate for farm labourer will help improving their standard of living, there is also a

need to find out as to what kind of impact this increased wage rate has made on the agricultural front, particularly on the cost of cultivation of different crops including the profitability in crops cultivation.

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