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Agricultural wages in India: trends and determinants

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Abstract Structural change in employment has been slow, particularly in agriculture, and its share in income has declined faster than employment has transitioned. This shift requires us to focus on the trends in agricultural wages. Our analysis shows that non-farm wages, the MGNREGS, irrigation facility, and rural literacy have a significant and positive effect on agricultural wages, and farm mechanization helps reduce the wage rate significantly. Creating more non-farm employment opportunities and supporting literacy programmes and irrigation will help improve farm wages, and incentivizing farm mechanization will reduce the cost of cultivation for farmers and the rural poor.

Keywords Panel data models, non-farm wages, agricultural wages, irrigation

JEL codes C33, E31, J31, Q1

In India, most labourers and their families work on farms, and they depend on agricultural wages for their livelihood. The percentage of labourers employed in wage-related activities rose from 45.6% in 2001 to 54.9% in 2011 (GoI 2016). The green revolution in the mid-1960s boosted agricultural growth, and studies on the trends in agricultural wages assumed significance. Structural change in employment has been slow, particularly in agriculture, and agriculture's share in income has declined faster than employment has transitioned. This shift requires us to focus on the trends in agricultural wages, because most agricultural labourers in rural India depend on farm work and agricultural wages for their livelihoods—they are poor and have few assets and employment opportunities.

Much research has been conducted on the issues of the rising trend in wages and labour scarcity, and also on the factors affecting rising wages, especially after the launch of the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) on 1 April 2008 (Chand et al. 2009; Pandey 2012; Jose 2013, 2016; Venkatesh 2013; Nagaraj et al. 2016). The rising trends in real wages are an important indicator of the welfare of the wage-dependent population, but dimensions such as sectors (farm and non-farm), operations (ploughing, sowing, and harvesting), and gender (male and female) need to be explored, and the spatial dimension of wages too needs investigation—given the country's large size and the variation in economic development.

We analyse the all-India data on real agricultural wages for farm labourers. Our analysis shows that the farm wage per person per day doubled from INR 83.50 in 1995–96 to INR 167.50 in 2016–17; for non-farm labourers, the real wage grew 74% (from INR 140.80 in 1995–96 to INR 245.00 in 2016–17). The rise in the farm wage was influenced by the non-farm wages, education, assured employment, and sustained growth in the non-farm sector, especially after the launch of the MGNREGS (Nagaraj et al. 2016).

Other key factors of the agricultural wage are irrigation, mechanization, yield, and cropping intensity (Bardhan 1970; Krishnaji 1971; Jose 1974; Lal 1976; Narayanmoorthy and Deshpande 2003; Datt and Ravallion 2007; Venkatesh 2013). The increase and variation in rural wages is influenced by non-agricultural factors such as the presence of trade unions, non-farm employment, and per capita income (Vaidyanathan 1986; Jose 1988; Sen 1996; Chand et al. 2009; Jose 2013).

The gender and location disparity in wages is significant from the viewpoint of balanced growth and social justice. Labour is one of the major components of crop production and livestock products, and labour cost makes up 40% of the total production cost (Deb et al. 2014); therefore, an increase in the production cost leads to inflationary pressure on the economy and raises market prices.

Employing the wage data for the period from 1970–71 to 2010–11, Jose (2016) examines the levels and trends in agricultural wages of male and female labourers in the major states of India, and finds that inter-state differences have been widening over time. This study extends the period up to 2016–17 and examines the trends in agricultural wages across states, farm operations, and gender. It also analyses the factors of agricultural wages in the major states of India.

Data and methodology

The payment in cash, kind, or both for agriculture or allied activities to a labourer who works in agriculture year-round or seasonally is called agricultural, farm, money, or nominal wage.[1] The nominal wage is not adjusted for inflation. In this paper, the main variable of interest is the agricultural wage rate. The wage rates for agricultural and non-agricultural operations are provided by the Labour Bureau of the Ministry of Labour and Employment, Government of India. The average daily wage rates are collected for 11 agricultural and 7 non-agricultural operations (GoI 2015).

We computed the average wage rate by considering and comparing the wage rates for seven agricultural operations—ploughing, sowing, transplanting, weeding, harvesting, threshing, and winnowing. To provide a better picture across study states, we combined the wage rates for transplanting and weeding with sowing, and the wages for threshing and winnowing with harvesting. We used regression analysis to examine the impact of relevant independent variables on wage rates, and we collated the datasets on agricultural and non-farm wages. (GoI 2015)

We used the Consumer Price Index for Agricultural Labourer (CPI-AL) (general) dataset; we obtained it from the 'Report on Consumer Price Index for Agricultural Labourers' (1986–87=100), published by Labour Bureau, Government of India. The CPI-AL indices were used to deflate the nominal wages into real wages by changing at base 100 (2009–10) for the purpose of this study.

We also used datasets on rural literacy (overall, rural male, and rural female) and agricultural labourers from the Office of Registrar General and Census. The data on net sown area, irrigated area, and labour availability was taken from 'Agricultural Statistics at a Glance', Ministry of Agriculture and Farmers' Welfare, Government of India. The data on wages has been compiled for the period from 1995–96 to 2016–17.

To identify the factors that influence agricultural wages, we estimated the fixed effects regression model using panel data. The model specified for state-level analysis is

$$\ln W_{it} = f\left(\ln NFW_{it}, Rlit_{it}, \ln\left(Lab/Land\right)_{it}, \ln\left(Tract/Land\right)_{it}, MGNREGS\right) \quad \ldots(1)$$

where, W is the agricultural wage rate (real term) in INR per person per day in the ith state for t^{th} year, *NFW* is the real non-farm wage rate in INR per person per day, *RLIT* is the rural literacy rate in percentage, *LAB/LAND* indicates labour intensity and is defined as availability of agricultural labour per hectare of net sown area, *TRACT/LAND* is the farm tractor availability per thousand hectares of net sown area used as a proxy for mechanization, *MGNREGS* is the dummy variable that represents operation of assured rural employment scheme from April 2008.

Agricultural labourers and farm tractors have a competitive and complementary relationship; therefore, we introduced their interaction into the model. To stabilize the variance, we performed log transformation of the variables used in the model. We used the Durbin-

[1]We use the terms 'agricultural wage', 'money wage', 'farm wage', and 'nominal wage' interchangeably in this paper.

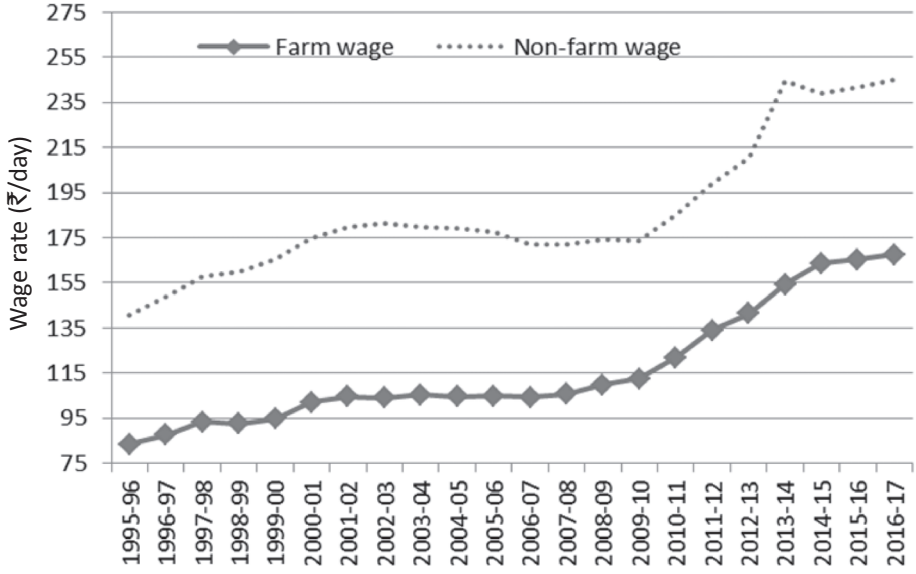

Figure 1 Trend in average real farm and non-farm wage rates per person per day at all-India level

Wu-Hausman test (Hausman specification test) to examine the suitability of the model. The Hausman test p-value was found to be highly significant (0.01), indicating that the fixed effects model was better than the random effects model.

Results and discussion

General trend in farm and non-farm real wages

We analysed the movements in the average real wage rates of the farm and non-farm sectors at the all-India level from 1995–96 to 2016–17 (Figure 1). Farm wages increased moderately after the mid-1990s. The movement picked up in 2000 and increased at a faster rate after 2008–09 before stagnating around the year 2014–15. The increase in the real farm wage rate is in accordance with the general perception that farm wages increased after the MGNREGS was launched in April 2008–09 (Pandey 2012; Jose 2013, 2016; Nagaraj et al. 2016). Non-farm real wages moved in tandem with farm wages. Non-farm wages were about 70% higher than the farm wages during the pre-MGNREGS period (1995–96 to 2008–09); the difference fell to 51% during the post-MGNREGS period (2008–09 to 2016–17). The MGNREGS helped increase employment opportunities and wage rates in the non-farm sector, but it also brought about the seasonal scarcity of labour in the farm sector. From 1995–96 to 2016–17, labour scarcity raised farm wages faster (3.1% per annum) than non-farm wages (2.2%).

Trends in farm wages

The nominal wage rose in the study states in the periods before and after the MGNREGS, though the magnitude varied (Table 1). In the pre-MGNREGS period, the nominal wage varied from about 49% in Madhya Pradesh to 106% in Tamil Nadu; in the post-MGNREGS period, the nominal wage varied from 152% in Punjab to 298% in Karnataka. To derive the pattern of increase in wages (nominal, real, operation-wise and gender-wise), we categorized the study states by the prevailing wage rates.

States with a wage rate between the minimum wage (W_{min}) and the average wage $\overline{W}$ were categorized as low-wage states; states between average wage and average wage plus one standard deviation ($\overline{W}+\sigma$) were categorized as moderate; and the remaining states were categorized as high-wage states. We used the formula:

$$W_{min} - \overline{W} : low, \overline{W} - \overline{W} + \sigma : Medium, \ others : High$$

In the pre-MGNREGS period, nominal wages increased greatly in Himachal Pradesh, Jammu & Kashmir, and Kerala; moderately in Haryana, Punjab, and Rajasthan; and marginally in the remaining states. The trend was similar in the post-MGNREGS period, except in Rajasthan, where the rate of increase grew from low to moderate. Overall, the pattern of increase remained the same in the study states except in Tamil Nadu, where the rate of increase grew from low to

Table 1 Change in nominal and real wages across major states of India: 1998–99 to 2016–17

(INR / person / day)

State	Nominal wages during TE			Real wages during TE			Change in real wages (%)		
	1998–99	2008–09	2016–17	1998–99	2008–09	2016–17	1998–99 to 2008–09	2008–09 to 2016–17	1998–99 to 2016–17
Andhra Pradesh	35.23	72.62	219.36	67.77	90.69	131.46	33.83	44.95	93.99
Assam	44.37	73.57	221.01	80.92	91.48	143.48	13.05	56.85	77.31
Bihar	33.12	62.07	221.74	63.14	74.94	153.10	18.68	104.30	142.47
Gujarat	42.61	69.64	198.90	83.72	87.35	123.49	4.34	41.37	47.51
Haryana	60.86	114.30	362.66	126.52	149.24	228.37	17.95	53.02	80.49
Himachal Pradesh	68.76	141.42	362.53	120.25	167.68	233.89	39.44	39.49	94.50
Jammu & Kashmir	83.27	150.28	410.35	158.66	187.62	270.94	18.25	44.41	70.76
Karnataka	34.46	57.64	229.15	65.14	75.04	129.12	15.20	72.07	98.23
Kerala	92.80	165.44	556.72	156.91	199.93	312.84	27.42	56.48	99.38
Madhya Pradesh	34.46	51.33	180.38	64.89	64.09	123.34	-1.24	92.45	90.07
Maharashtra	34.65	61.96	198.04	71.67	79.77	122.51	11.30	53.57	70.93
Odisha	33.71	55.98	168.08	62.09	68.87	122.92	10.92	78.47	97.96
Punjab	56.32	110.90	279.16	116.96	142.57	181.68	21.90	27.43	55.34
Rajasthan	55.62	87.35	265.71	116.34	111.17	166.61	-4.44	49.86	43.21
Tamil Nadu	46.61	79.82	314.37	87.98	100.01	181.20	13.67	81.18	105.95
Uttar Pradesh	38.95	68.13	200.16	75.32	83.23	134.31	10.50	61.38	78.32
West Bengal	40.48	75.35	224.01	75.49	95.65	147.68	26.71	54.39	95.63
India	48.31	85.90	264.77	91.17	106.62	165.49	16.95	55.22	81.52

Source Authors' estimates

moderate, and in Himachal Pradesh, where the rate of increase fell from high to moderate.

Nominal wages vary widely by state. The wage per day was high (above INR 300 per person per day) in Haryana, Tamil Nadu, Himachal Pradesh, Jammu & Kashmir, and Kerala in 2016–17; it was low in Assam, Bihar, Madhya Pradesh, Odisha, Uttar Pradesh, and West Bengal (around INR 200 per person per day). In 2008–09, the wage rate was low (below INR 100 per person per day) in most states—except Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir, and Kerala.

Was the rising trend in nominal wages being realized with the increase in real wages? Was the nominal wage keeping pace with the prices of commodities purchased by agricultural labourers? To answer this question, we changed the nominal wage into the real wage using the CPI-AL (general) (Table 1).

The data shows that all-India real wages rose by 17% in the pre-MGNREGS period and by 55% in the post-MGNREGS period, and that in each period and overall, the real wages varied by study state. In the pre-MGNREGS period, the absolute increase in real wages was high in Haryana, Jammu & Kashmir, and Kerala; moderate in Himachal Pradesh, Punjab, and Rajasthan; and low in the remaining states except Madhya Pradesh and Rajasthan (the real wage fell in these states). In the post-MGNREGS period, real wages increased in all states except Himachal Pradesh and Haryana; the rate of increase in wages rose from moderate to high in Himachal Pradesh and fell from high to moderate in Haryana. Nominal and real wages increased in varying degrees in the study states in the pre- and post-MGNREGS periods and overall.

The rise in wages could have been due to better work opportunities under the MGNREGS, wherein wages are paid as per the CPI-AL or the fixed minimum wage

Table 2 Change in real wages by agricultural operations in major states of India during TE 2008–09 to TE 2016–17

(INR / person/ day)

State	TE 1998–99			TE 2008–09			TE 2016–17		
	Ploughing	Sowing	Harvest-ing	Ploughing	Sowing	Harvest-ing	Ploughing	Sowing	Harvest-ing
Andhra Pradesh	90.9	59.9	70.1	116.7	84.3	91.9	176.6	126.6	125.1
Assam	95.9	75.7	79.9	99.4	91.0	91.0	166.0	141.4	140.9
Bihar	74.1	62.1	61.5	93.7	70.9	72.8	174.0	151.9	149.9
Gujarat	100.3	78.0	83.9	110.7	81.9	84.6	143.1	121.3	118.6
Haryana	142.5	119.8	131.2	150.4	144.2	154.8	240.9	224.7	228.1
Himachal Pradesh	141.5	116.1	119.2	203.0	158.1	163.5	281.9	221.3	227.7
Jammu & Kashmir	163.6	134.4	172.3	163.1	175.1	196.6	259.7	254.4	289.0
Karnataka	79.5	61.7	65.7	96.9	72.1	73.6	171.5	125.1	125.1
Kerala	255.4	139.9	143.5	324.1	207.2	157.4	402.6	317.6	289.8
Madhya Pradesh	77.2	61.8	65.5	78.3	61.6	63.0	132.2	117.9	127.1
Maharashtra	93.5	69.7	68.9	106.5	76.5	79.0	158.0	119.4	120.4
Odisha	69.1	60.3	63.1	81.4	69.5	66.7	145.7	118.9	122.2
Punjab	130.4	122.0	113.1	154.6	137.3	142.5	221.1	174.7	180.4
Rajasthan	141.3	98.9	128.6	143.2	105.2	107.8	172.7	163.3	174.2
Tamil Nadu	153.7	71.1	84.1	171.8	89.9	88.7	283.2	159.0	178.4
Uttar Pradesh	86.6	72.4	76.5	93.1	81.6	83.0	146.4	132.1	135.6
West Bengal	107.8	71.5	68.9	137.3	88.1	88.5	202.3	137.7	138.4
India	113.0	85.3	91.1	132.5	102.7	103.1	197.0	159.9	164.0

Note Wage rate for sowing also represent for transplanting and weeding, as separate wage rates for these activities are not reported. Also, wages for threshing and winnowing is combined with harvesting.
Source Authors' estimates

rate—whichever is higher (Jose 2013). Also, the farm sector provides only seasonal employment, and the labour force seeks a regular source of earning in the non-farm sector (construction, dairy, transport, etc.) (Prabakar et al. 2011; Venkatesh 2013).

Farm wages by agricultural operations

The MGNREGS has increased labour scarcity; therefore, fewer labourers are available in the cropping seasons for performing critical farm operations, and real wage rates have increased too (Table 2) (Gulati et al. 2014). Production cost has been rising as well, machinery has replaced human and bullock labour, and the use of chemicals has been increasing; together, all these have about a marked change in the cropping pattern and nature of farming in India (Prabakar et al. 2011; Nagaraj et al. 2016). Some farm operations require skills and harder labour.

It is important to critically examine the changes in wage rates across farming operations in study states. In the pre-MGNREGS period and overall, the percentage increase in wages was highest for sowing, followed by harvesting and ploughing. In the post-MGNREGS period, the increase was highest in harvesting, followed by sowing and ploughing. Ploughing is hard work, and its wage rate is higher; also, ploughing is performed only by male labourers, who normally receive higher wages than women labourers in many states (Nagaraj et al. 2016). The use of tractors has reduced the role of ploughing, however, and that may be why the rise in wages is lowest for ploughing in the pre- and post-MGNREGS periods at the all-India level and the magnitude varies by study state.

The wages for ploughing were higher than sowing or harvesting in Kerala in 1998–99, 2008–09, and 2016–17. The rate of increase in wages in Himachal Pradesh

Table 3 Change in real wage between male and female labour across states, 1998–99 to 2016–17

(INR /person/ day)

State	1998–99		2008–09		2016–17	
	Male	Female	Male	Female	Male	Female
Andhra Pradesh	79.9	55.6	106.3	75.1	154.1	108.8
Assam	83.8	78.0	97.5	85.5	156.6	130.4
Bihar	68.7	57.5	81.4	68.5	165.1	141.1
Gujarat	89.3	78.1	94.4	80.4	129.1	117.9
Haryana	138.3	114.7	151.5	147.0	233.0	223.8
Himachal Pradesh	131.2	109.3	175.4	160.0	244.4	223.3
Jammu & Kashmir	142.3	175.1	156.0	219.3	262.8	279.1
Karnataka	73.8	56.5	88.0	62.1	155.4	102.8
Kerala	194.4	119.4	253.7	146.2	366.0	259.7
Madhya Pradesh	72.3	57.5	71.0	57.1	128.7	117.9
Maharashtra	84.0	59.4	98.5	61.0	147.7	97.3
Odisha	67.6	56.5	78.4	59.3	136.4	109.5
Punjab	132.9	101.0	143.8	141.4	204.5	158.9
Rajasthan	130.9	101.8	124.6	97.7	181.4	151.9
Tamil Nadu	112.1	63.9	128.8	71.2	233.2	129.2
Uttar Pradesh	83.1	67.5	89.6	76.8	144.7	124.0
West Bengal	86.8	64.2	107.8	83.6	163.9	131.5
India	101.0	81.3	117.6	95.6	182.8	148.1

Source Authors' estimates

rose from moderate in 1998–99 to high in 2008–09 and 2016–17. The increase in real wages for ploughing was moderate in Haryana, Punjab, Rajasthan, and Tamil Nadu during triennium ending(TE)1998–99 and 2008–09 but low in Rajasthan and Tamil Nadu in 2016–17. The wages for ploughing were low in the other states in all the periods. Thus, tractor use has raised the wages for ploughing.

The patterns are similar for sowing and harvesting in the study states in all the periods. The wage rate was low in Andhra Pradesh, Assam, Bihar, Gujarat, Karnataka, Madhya Pradesh, Odisha, Maharashtra, Tamil Nadu, Uttar Pradesh, and West Bengal. The wage rate was moderate in Punjab and Haryana in 1998–99, 2008–09, and 2016–17. The wage rate was mostly high in Himachal Pradesh, Kerala, and Jammu & Kashmir.

Gender differentials

Male labourers earned a higher wage than females in all states except Jammu & Kashmir in all periods (Table 3). The all-India difference in wages was about 23–24% in 1998–99, 2008–09, and 2016–17. In TE 1998–99, the male–female wage difference ranged from about 7% in Assam to 75% in Tamil Nadu. From TE 2008–09 and 2016–17, male and female labourers in the study states experienced similar patterns of increase in wages. In all the periods, compared to male labourers, females experienced a higher percentage of increase in wages. The trend of high wages prevailed for female labourers in all the periods in Jammu & Kashmir. Wages were moderate in Haryana, Punjab, Rajasthan, and Tamil Nadu, and low in the remaining states. Throughout the entire period, female labourers earned a high wage rate in Haryana, Himachal Pradesh, Jammu & Kashmir, and Kerala, a moderate rate in Punjab, and a low rate in the remaining states. Broadly, thus, male and female labourers similar pattern of wage increases across states prevailed for both. Policymakers and institutions can use the information on the gender gap in wage rates—due to experience, nature of work, and education—to bridge the gap and improve the lives of labourers.

Table 4 Determinants of farm wages with respect to overall, male workers and female workers

Explanatory variables	Overall	Male workers	Female workers
Non-farm wages (real) per person per day (Rs)	0.8243***	0.8322***	0.8158***
MGNREGS (after 2007 = 1, otherwise = 0)	0.1195***	0.1104***	0.1246***
Proportion of net irrigated area of net sown area	0.0032**	0.0022	0.0040**
Rural literacy (%) for overall; otherwise respective figures used (male & female)	0.0039*	0.0064**	-0.0374*
Farm tractor availability (number) of net sown area	-0.0184	-0.0069	-0.1583*
Labour availability (number) of net sown area	-0.1146**	-0.1026**	-0.1583***
Interaction (labour and tractor)	0.0487***	0.0388**	0.0658***
Number of observation	315	315	315
F (7, 293)	356.153	355.460	262.915
Prob > F	0.0000	0.0000	0.0000
R-square	0.89483	0.89465	0.86266

Source Authors' estimates.
Note ***, *** and * denote significance at 1%, 5% and 10% levels, respectively.

Factors of agricultural wages

We used a fixed effects regression model to identify the factors of wage rates (Table 4). For overall (total) farm workers, the regression coefficient was 0.8243 for non-farm wages, 0.1195 for the MGNREGS, 0.0032 for irrigation intensity, 0.0039 for rural literacy, "0.0184 for labour supply, "0.1146 for farm tractor availability, and 0.0487 for interaction effect.

The coefficient of 'non-farm wage' was significant and had a positive sign, and it significantly influenced the wage rates. The coefficient implies that a 1% increase in non-farm wages raises the agricultural wage by 0.8243%. Non-farm activities (construction, repairs, personal services, transport, etc.) in nearby towns and cities offer causal labourers better work opportunities and higher wages and, thereby, raise farm wages.

The MGNREGS has emerged as a significant variable; it increased the wage rate by 12% over the pre-implementation period. The irrigation facility variable has a significant and positive coefficient, and it influences the wage rate. Irrigation helps improve the use and utilization efficiency of other farm inputs; and the improvement in yield and cropping intensity leads labourers to expect an increase in wages (Sidhu 1988; Narayanmoorthy and Deshpande 2003; Datt and Ravallion 2007). Rural literacy has a significant and positive coefficient; an improvement in the education level raises awareness, and helps in the search for better and better-paying work opportunities, raises bargaining power, and all these improve the wage rates.

The coefficient of tractor use was found to be negatively associated with agricultural wage rates; tractor use reduces wage rates. Non-farm opportunities such as MGNREGS activity have been increasing, and these have made labour scarce, especially during the peak farming season. The labour scarcity is rising, and farmers increasingly use tractors for ploughing and other farm operations; farm operations are completed on time, and the wage increase is minimal.

The supply of agricultural labour is important in determining wage rates. The coefficient of labour intensity (agricultural labour availability per hectare of net sown area) was found to be negative. This shows that the labour availability per unit of net sown area is high, and it implies that the increase in wage rate is low.

The interaction effect of tractor use and agricultural labour has a positive and significant coefficient. It shows that farm mechanization and agricultural labour complement each other in improving marginal productivity and, thereby, raising wage rates. The results are similar for male and female workers and with varying magnitude. This shows that the specified variables in the models are important in determining wage rates.

Agricultural wages are highest in Haryana, and we used it as the benchmark. We analysed the state fixed effects regression model for overall farm workers and we found that agricultural wages were lower in all the study states except Andhra Pradesh, Assam, and Bihar than predicted by the model. Compared to Haryana, the relative decline in wage growth was predicted to be less by 0.33 in Kerala, 0.25 in Uttar Pradesh, 0.194 in Punjab, and 0.191 in Gujarat. After controlling for other independent variables, the ratio was found to be less than 0.05 units compared to Haryana for Karnataka, Madhya Pradesh, Maharashtra, Odisha, and Tamil Nadu. The results were similar for male and female workers with varying magnitude.

Conclusions and policy implications

Using wage data for the major states of India for the period from 1995–96 to 2016–17, this study examined the trends in real agricultural wages, and it found that the pattern of increase in wages (nominal, real, by operations and gender) was broadly similar in the study states and periods, with varying degrees. At the country level, wages increased steadily during all the three periods (1998–99, 2008–09, and 2016–17). Nominal wages increased similarly at the country level and in the study states, with varying degrees. In all the periods, the real increase in wages was high in Haryana, Jammu & Kashmir, and Kerala; moderate in Himachal Pradesh, Punjab, and Rajasthan; and minimal in the remaining states. Wages for sowing and harvesting increased similarly.

Wages were low in most states: Andhra Pradesh, Assam, Bihar, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh, and West Bengal. The male–female wage gap has grown over the years, and the percentage increase in wages was higher for females than males. The wages were higher for females in Haryana, Himachal Pradesh, Jammu & Kashmir, and Kerala, and Punjab remained in the moderate wage category throughout. Male labourers experienced a similar pattern of increase in wages. We analysed the determinants of wages, and we found that 'non-farm wages' affect the upward movement in agricultural wages. The MGNREGS was a key factor in the rise of farm wages. Irrigation facility and rural literacy were critical variables affecting agricultural wage rates.

Rising agricultural wage rates help reduce poverty in rural areas, and there is a need to influence the wage rate (Lanjouw and Shariff 2004) by creating opportunities in the non-farm sector, allocating more funds to employment-generating programmes like the MGNREGS, and improving irrigation infrastructure and rural literacy. All these will help reduce poverty. Farm wages in India are lower than non-farm wages, but the share of labour cost in crops and livestock production is around 40%, and farmers find it hard to pay the rising farm wages. The rural youth are reluctant to farm, and this challenge will become even more critical in the future.

Farm mechanization can tackle rising farm wages and labour scarcity—especially during the peak farming season—by helping farmers complete agricultural operations timely, cover a large area in a short time, and use inputs, including water, efficiently (Singh et al. 2014). It would reduce the cost of cultivation and increase farmer productivity and income. Custom hiring centres in villages hire out farm machinery and implements, and these have improved mechanization on small farms. More custom hiring centres should be set up in rural areas. That will help farmers to tide over the labour shortage, reduce the cost of cultivation, and, ultimately, increase agricultural income.

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