

Gender Disparities in Wages among Casual Labourers and Agricultural Workers in India: A Statistical Analysis in the Context of SDG 5

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DOI: <https://doi.org/10.51584/IJRIAS.2026.11070037>

Received: 05 July 2026; Accepted: 10 July 2026; Published: 29 July 2026

ABSTRACT

Background: Gender-based wage disparities remain a critical challenge to achieving Sustainable Development Goal 5 (SDG 5), which advocates for gender equality and the empowerment of women. In India, despite substantial economic growth, women often remain underpaid compared to their male counterparts, particularly in casual labour and agricultural sectors. Understanding the magnitude and trends of these disparities is crucial to addressing systemic inequalities and informing policy reforms.

Methods: This study utilized secondary data obtained from the Ministry of Statistics and Programme Implementation (MOSPI) for the years 2017-2021. Descriptive statistics were employed to examine wage distributions and test for normality. Nonparametric methods, including the Mann-Whitney U test, were applied to evaluate gender differences in labourer and agricultural wages. The Kruskal-Wallis test was further used to compare the magnitude of wage disparities across years. Data were analysed separately for male and female workers across occupational categories.

Results: The analysis revealed consistent and statistically significant gender-based wage disparities. Male casual labourers reported a higher mean rank wage (239.87) compared to females (131.13), with $p < 0.001$. Similarly, male agricultural workers (225.69) earned significantly more than female workers (145.31), also with $p < 0.001$. The Kruskal-Wallis test confirmed that wage gaps persisted across years, though the magnitude of disparities widened over time in both labourer and agricultural work, particularly in 2020 and 2021. Regional trends further highlighted variations, with certain states exhibiting larger wage differences.

Conclusion: The findings underscore persistent gender wage inequality in India's labour and agricultural sectors, which poses a substantial barrier to achieving SDG 5. The consistent statistical significance of disparities across years highlights structural imbalances in the labour market. Policymakers must prioritize targeted interventions-such as equal pay legislation, social protection measures, and skill development programs-to reduce the wage gap and foster gender-inclusive economic growth.

Keywords: Gender wage gap, casual labour, agricultural wages, sustainable development goals, wage inequality, labour market disparities.

INTRODUCTION

Gender-based wage disparity is a pervasive issue globally, and in India, it remains a significant barrier to achieving Sustainable Development Goal 5 (Gender Equality), especially with respect to economic participation and "equal pay for work of equal value." Empirical studies have consistently documented that

women earn less than men across sectors, with disparities particularly marked in informal, agricultural, and casual labour markets. For instance, Kundu and Das (2019) found evidence of wage discrimination in agriculture across 18 major Indian states during 2010-11 to 2015-16, and identified factors such as female-education, cropping intensity, and the presence of self-help groups as important in reducing the gender wage gap.⁶ Despite performing similar work under the same working condition, the female laborers are mostly unorganized and unaware of their constitutional rights. Therefore, more than 90 percent of the rural females are treated as a cheap and secondary source of laborers.³

Norms related to gender and expectations of women's behaviour are also consistent explanations offered in the literature for differences in women's labour force participation across, and even within, countries.⁴ The casual labour market showed that women earn only about 60 percent of what men earn, and examined the role of the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) in affecting this gap. Another strand of research emphasizes the role of social stratification, gender norms, and caste in shaping gender wage gaps, with studies like Mahajan (date) finding that differences in female labour supply (influenced by norms and caste) explain a sizable portion of wage gaps between northern and southern states of India.⁷

Not only are the gaps large, but they are persistent over time. Rustagi (2005) observed that while economic growth and increased female participation in labour markets raised overall wages and incomes, they did not necessarily result in narrowing inequality between men's and women's earnings due to entrenched biases, occupational segregation, and informal sector dominance.⁹ In addition, "The Agricultural Wage Gap Within Rural Villages" study provides evidence that even within rural contexts, sectoral shifts between agriculture and non-agriculture contribute to wage differentials.²

In the Indian agricultural labour market, it is commonly perceived that female agricultural workers are unable to perform physically demanding tasks due to lower muscle strength and malnutrition. It is often argued that male labourers, possessing greater physical strength and stamina, are more productive and efficient than their female counterparts. Consequently, from the employer's perspective, male workers are considered deserving of higher wage rates and more workdays than female labourers, even when engaged in the same agricultural activities (Kundu, 2013).⁵ Wage discrimination in agriculture across 18 major states over 2010-11 to 2015-16. It analyses how female education, cropping intensity, and self-help group participation are associated with narrowing the gender wage gap.⁶ Monthly panel data from rural India examined the wage differences between men and women working in farm vs non-farm sectors. It finds large cross-sectional wage gaps, especially for women, driven in part by their limited mobility and lower participation in non-farm employment.⁸

The expansion of MGNREGA has frequently been examined for its potential to reduce gender wage gaps—either by directly raising wages for women in rural areas, or by providing alternative employment that affects bargaining power. Kundu & Das (2019) note mixed results for MGNREGA's effectiveness in reducing gaps in agricultural wages.⁶

There is also growing interest in how informal employment, education-occupation mismatch, and regional differences affect wage disparities. Bahl & Sharma (2023) highlighted how informality and mismatches between education and job roles exacerbate wage gaps in India. Also, "Caste, Female Labor Supply, and the Gender Wage Gap in India" explores how demographic and social variables like caste mediate the extent of the wage gap.¹ The wage differential patterns between agricultural labourers and rural non-farm labourers, highlighting regional variations in real wage rates. Usami (2011) The study identified that northern had relatively higher wage rates than central, eastern states were found to have comparatively lower wage rates.¹¹

Given this backdrop, there is a need for updated analyses using recent data, comparing not just agricultural labour but casual labour more broadly, stratified by gender and over time, to see how wage differentials evolve, vary by type of work, and whether gaps are narrowing or widening. Based on the given consideration, the objectives of the present study are:

1. To examine gender-based differences in labourer wages across different years.
2. To analyse gender disparities in agricultural wages over time.

3. To evaluate trends in wages over time, stratified by gender.
4. To examine the influence of agricultural wages, labourer wages, age, and education on yearly and monthly wage outcomes among male and female workers using Ordinary Least Squares (OLS) regression analysis.

DATA AND METHODOLOGY

The present study is based on secondary data obtained from the Ministry of Statistics and Programme Implementation (MOSPI), Government of India, covering the period from 2017 to 2021. The dataset included information on the average daily wages of male and female casual labourers and agricultural workers across different states and union territories of India. The key variables considered were wages (in INR) as the dependent variable, while gender (male, female), year of observation (2017-2021), type of occupation (casual labour, agricultural work), and geographical region (state/UT) served as independent variables. The analysis was carried out using SPSS software. Descriptive statistics, including mean, standard deviation, skewness, and kurtosis, were employed to understand the overall distribution of wages. The Kolmogorov-Smirnov test was used to test for normality of the wage data. Since the data did not follow a normal distribution, non-parametric tests were applied. The Mann-Whitney U test was used to compare wage distributions between men and women within labourer and agricultural categories, while the Kruskal-Wallis test was applied to examine differences in wage disparities across years and sectors. To reduce skewness and stabilize the variance, a natural logarithmic (log) transformation was applied to the continuous wage variables. After transformation, the distributions were re-examined and found to be approximately normal, making them more suitable for parametric analysis. The transformed variables were subsequently used to estimate Ordinary Least Squares (OLS) multiple linear regression models. Separate regression models were developed for male and female workers to examine the association of agricultural wages, labourer wages, age, and education with yearly and monthly wage outcomes. The regression coefficients (β) were used to assess the direction and magnitude of the relationship between each predictor and the outcome variable while controlling for the remaining variables included in the model. In addition, trend analysis using line graphs was performed to visualize temporal patterns in wages stratified by gender. This mixed approach allowed for a comprehensive assessment of wage inequalities in relation to SDG 5.

ANALYSIS AND RESULT

The descriptive statistics presented in Table 1 provides an overview of the wage distribution among labourers and agricultural workers. The mean wage for labourers was higher (1194.18) compared to agricultural workers (882.91), indicating a wage gap between the two categories of employment. Both distributions displayed relatively high variability, as reflected by the large standard deviations (547.82 for labourers and 560.78 for agricultural workers), suggesting considerable heterogeneity in wage earnings within each group. Skewness values were positive (0.297 for labourers and 0.317 for agricultural workers), implying a slight right-tailed distribution, where a smaller proportion of workers earned substantially higher wages than the majority. Kurtosis values (1.323 for labourers and 0.648 for agricultural workers) suggest that labourer wages had a more peaked distribution compared to agricultural wages, which were closer to a normal distribution but still flatter. (Table 1)

Table 1: Descriptive Statistics

	Mean	Std. Dev	Skewness	Kurtosis	KS Test
Labourer wage	1194.18	547.825	0.297	1.323	<0.001
Agricultural wage	882.91	560.785	0.317	0.648	<0.001

The Kolmogorov-Smirnov (KS) test values (<0.001 for both groups) indicated that neither wage distribution followed normality, which has implications for further statistical testing. Overall, these results highlight wage

disparities that may have gendered underpinnings, aligning with SDG 5's emphasis on reducing inequalities in economic opportunities. **(Table 1)**

Table 2: Gender based differences in Labourer and Agricultural wages

	Gender	Mean Rank	p-value
Labourer wage	Male	239.87	<0.001
	Female	131.13	
Agricultural wage	Male	225.69	<0.001
	Female	145.31	

The Mann-Whitney U test results reveal significant gender-based disparities in both labourer and agricultural wages. For labourer wages, men had a substantially higher mean rank (239.87) compared to women (131.13), with the difference being statistically significant ($p < 0.001$). This indicates that male labourers consistently earned higher wages than their female counterparts. A similar pattern was observed for agricultural wages, where men again had a higher mean rank (225.69) compared to women (145.31), and the difference was statistically significant ($p < 0.001$). These findings provide robust evidence of a gender wage gap across both labourer and agricultural employment categories, highlighting systemic inequalities in earnings between men and women. The persistence of such disparities underscores the challenges in achieving Sustainable Development Goal 5 (SDG 5), which emphasizes gender equality and the elimination of economic discrimination against women. **(Table 2)**

Table 3: Comparison of Gender based gaps in Labourer and Agricultural wages across different years

		Labourer wage	Agricultural wage
Year	2017	140.82	155.68
	2018	162.81	172.34
	2019	175.58	175.74
	2020	207.16	196.45
	2021	241.12	227.30
p-value		<0.001	<0.001

The Kruskal-Wallis test results in Table 3 highlight how gender wage disparities evolved over time in both labourer and agricultural work. Across all years, mean rank values were consistently higher for labourer wages than for agricultural wages, suggesting a relatively larger wage gap in labour-based employment. In 2017, the gender wage disparity was more pronounced in agriculture (mean rank 155.68) than in labour work (140.82), but from 2018 onwards, labourer wages consistently showed greater mean rank values compared to agricultural wages, reflecting widening gender differentials. By 2021, the disparity had reached its peak, with labourer wages at a mean rank of 241.12 and agricultural wages at 227.30, indicating sustained and growing inequality in both categories. The Monte Carlo significance values (<0.001 for both groups) confirmed that these observed differences were statistically significant across the years. Overall, the analysis demonstrates that while gender wage gaps persist in both sectors, they appear to be more pronounced and increasing in labourer wages compared to agricultural wages, underscoring structural inequalities that directly challenge the achievement of SDG 5 on gender equality in economic participation. **(Table 3)**

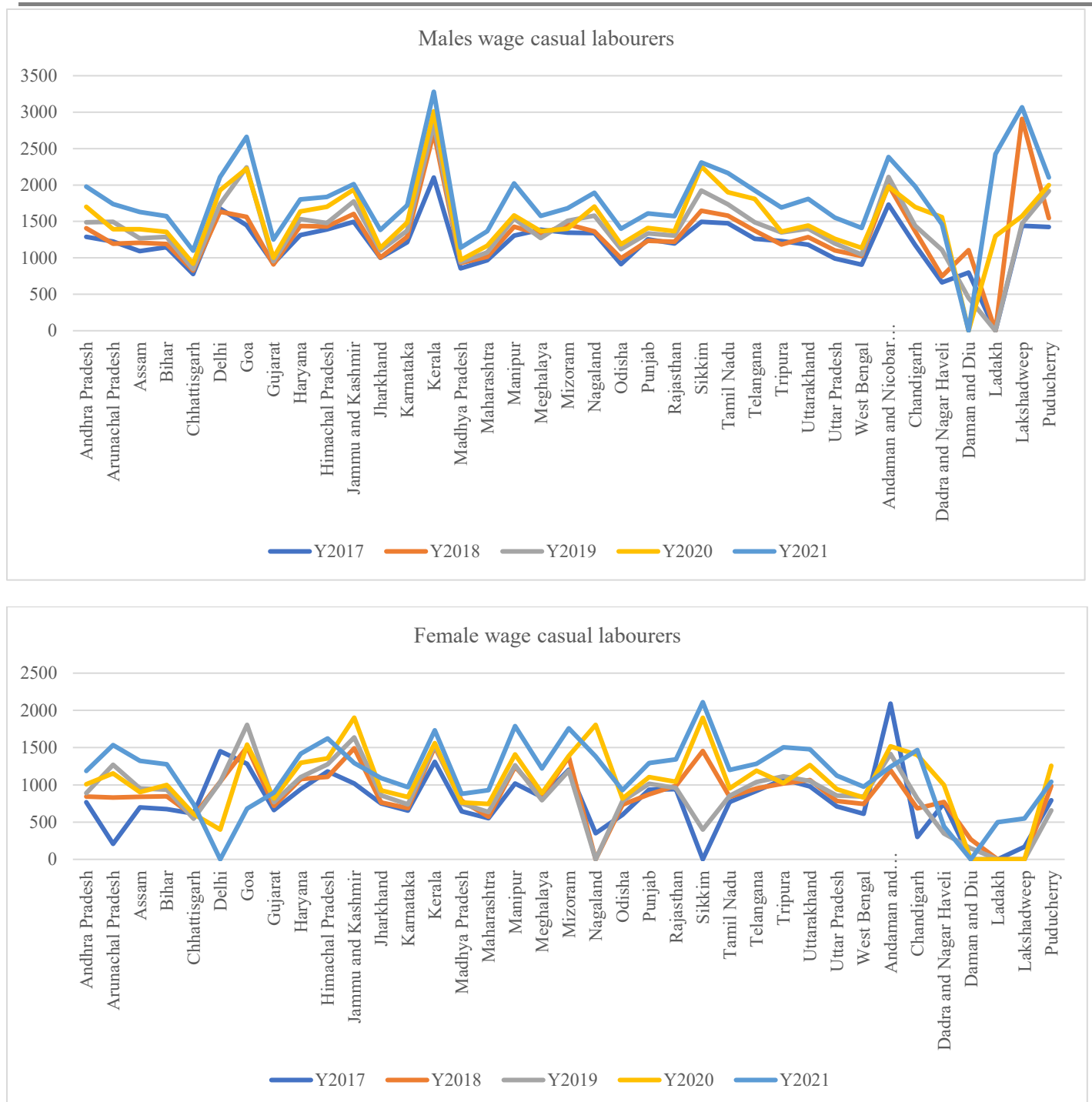


Figure 1: Gender based trends in labourer wages across different states and years

The wage trends over time, disaggregated by gender and type of work, reveal consistent gender disparities alongside regional variations. For casual labourers, male wages were generally higher than female wages across all states and years (2017-2021). Male casual labourers showed gradual upward wage trends, with peaks observed in states like Karnataka, Maharashtra, and Daman & Diu, where wages crossed 3000 in later years. In contrast, female casual labourers exhibited relatively lower wages, typically ranging between *1000-2000, with fluctuations across states and years, and more pronounced dips in regions such as Odisha, Andaman & Nicobar, and Puducherry. **(Figure 1)**

A similar pattern was evident in agricultural wages, where men consistently earned higher wages than women. Male agricultural wages, though lower than those in casual labour, showed modest increases over time, particularly in Maharashtra and Himachal Pradesh. Female agricultural wages remained relatively suppressed, with many states reporting values below 1000 across years, and wide fluctuations seen in Goa, Odisha, and union territories like Andaman & Nicobar. **(Figure 2)**

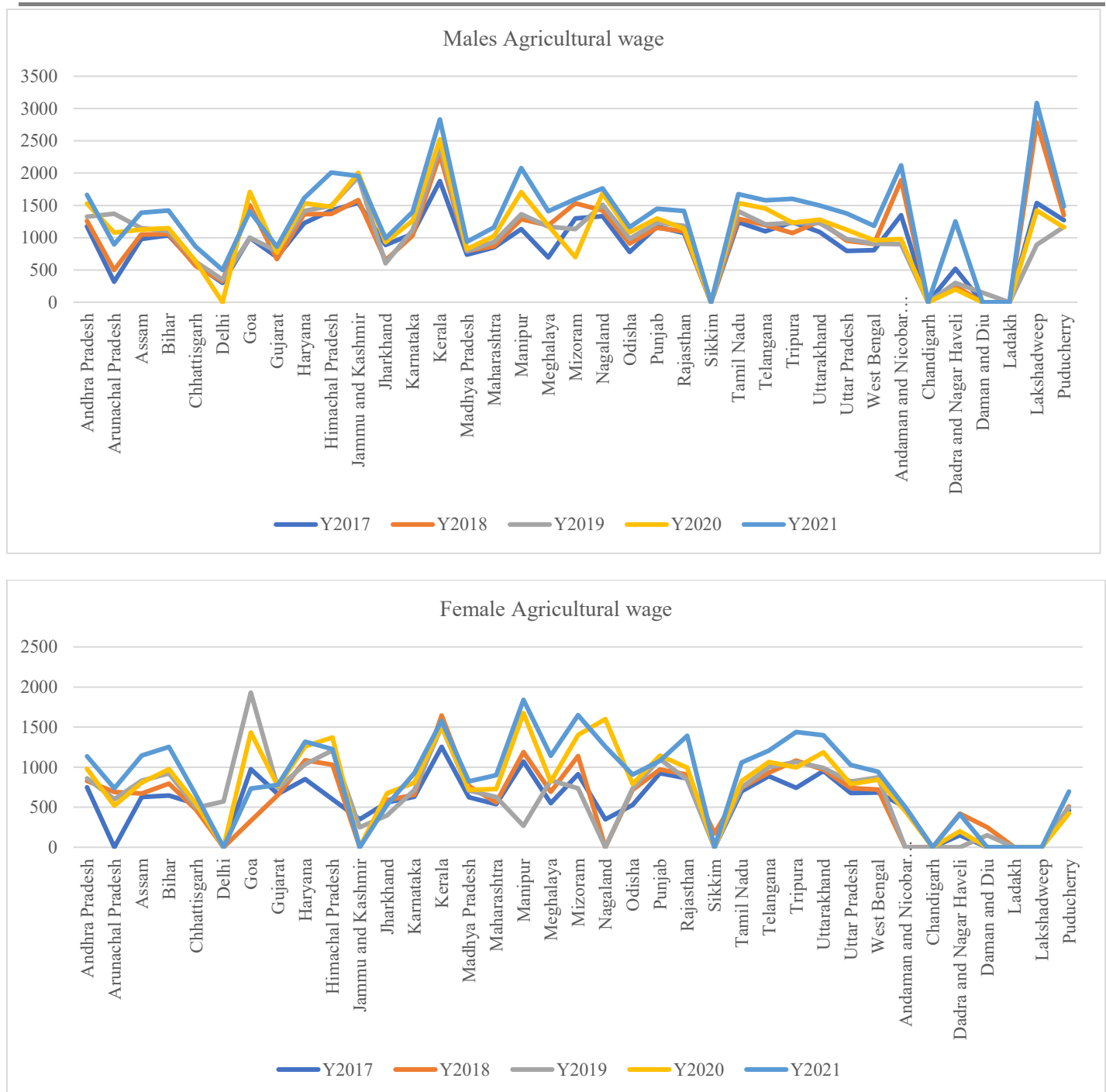


Figure 2: Gender based trends in agricultural wages across different states and years

The temporal analysis indicates a gradual rise in wages for both genders, but with men benefitting disproportionately compared to women. The persistence of these disparities across multiple states and years highlights entrenched gender inequalities in labour markets. This trend poses a direct challenge to SDG 5 (Gender Equality), as equal pay for equal work remains unachieved despite overall wage growth.

Table 4. Wage Gaps – Comparing with Gender

	Variables	Yearly	Monthly
Female	Agricultural wages	0.129	0.092*
	Labourer wages	0.396	0.260

	Age	0.025**	0.027**
	Education	0.005***	0.013**
Male	Agricultural wages	0.086*	0.0812*
	Labourer wages	0.321	0.150
	Age	0.018**	0.029**
	Education	0.006***	0.015**

$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The table 4 presents the results of the Ordinary Least Squares (OLS) multiple linear regression analysis examining the influence of agricultural wages, labourer wages, age, and education on yearly and monthly wage outcomes separately for female and male workers. Prior to model estimation, the wage variables were logarithmically transformed to satisfy the normality assumption required for OLS regression.

Among female workers, agricultural wages showed a positive association with both yearly ($\beta = 0.129$) and monthly ($\beta = 0.092$, $p < 0.05$) wage outcomes. Although the coefficient for yearly wages was not statistically significant, the significant monthly coefficient indicates that improvements in agricultural wages contribute positively to women's monthly earnings. Labourer wages also exhibited positive coefficients for yearly ($\beta = 0.396$) and monthly ($\beta = 0.26$) earnings; however, these relationships were not statistically significant, suggesting that labourer wages alone did not independently explain wage variation after adjusting for age and education.

Age emerged as a significant positive predictor of female wages in both yearly ($\beta = 0.025$ $p < 0.01$) and monthly ($\beta = 0.027$, $p < 0.01$) models, indicating that older women generally earned higher wages than younger women, possibly reflecting greater work experience and labour market participation. Education also demonstrated a statistically significant positive effect on both yearly ($\beta = 0.005$, $p < 0.001$) and monthly ($\beta = 0.013$, $p < 0.01$) wages, highlighting the importance of educational attainment in improving women's earning potential.

For male workers, agricultural wages were positively associated with yearly ($\beta = 0.086$, $p < 0.05$) and monthly ($\beta = 0.081$, $p < 0.05$) wage outcomes, indicating that higher agricultural wages significantly contributed to improvements in male earnings. Labourer wages showed positive but statistically non-significant coefficients for yearly ($\beta = 0.321$) and monthly ($\beta = 0.15$) wages, suggesting a comparatively weaker independent contribution after accounting for other explanatory variables. Similar to the female models, age remained a significant determinant of male earnings for both yearly ($\beta = 0.018$, $p < 0.01$) and monthly ($\beta = 0.029$, $p < 0.01$) wages. Education was likewise positively and significantly associated with yearly ($\beta = 0.006$, $p < 0.001$) and monthly ($\beta = 0.015$ $p < 0.01$) wage outcomes.

Overall, the findings indicate that age and education consistently influence wage outcomes for both genders, whereas agricultural wages exhibit a modest but significant positive association, and labourer wages do not retain statistical significance after controlling for other variables.

CONCLUSION

The study provides compelling evidence of persistent gender disparities in wages among both casual labourers and agricultural workers in India between 2017 and 2021. Men consistently earned significantly higher wages compared to women, and this gap persisted across states and years, despite overall increases in wages for both groups. The findings underscore structural inequalities in labour markets that disadvantage women, thereby slowing progress toward the achievement of SDG 5, particularly the target of ensuring equal pay for work of

equal value. Policymakers must address these disparities by strengthening wage protection laws, ensuring enforcement of equal remuneration policies, and designing gender-sensitive labour reforms. Bridging this wage gap is essential not only for gender equity but also for fostering inclusive economic growth in India.

Funding: Not applicable.

Conflict of interest: The authors declare no conflict of interests.

Data source: This study utilized a secondary dataset downloaded from MoSPI (Ministry of Statistics and Programme Implementation) website.

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