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Changes in Work Participation across Genders in Rural India

Evidence from 2019 and 2024 Time Use Surveys

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ABSTRACT

This study examines gendered patterns of time use in rural India using nationally representative time use surveys from 2019 and 2024, capturing shifts in labor force participation amid significant socioeconomic changes, including the COVID-19 pandemic. The analysis reveals a notable rise in rural women's labor force participation—from 32 percent to 35.9 percent in agriculture—with a 38 percent increase in their paid agricultural work time. However, this progress coexists alongside entrenched gender disparities in unpaid domestic work, where women continue to spend nearly five hours daily, limiting their engagement in nonagricultural employment, which remains male-dominated and stagnant for women. Using multivariate regression and Gelbach decomposition, the study identifies gender, landholding, education, income, and caste as significant determinants of time allocation. Yet, much of the increase in women's work time is driven by unobserved factors, likely linked to post-pandemic livelihood adjustments and structural constraints. The findings underscore that recent gains in women's participation reflect genuine shifts rather than statistical artefacts but caution that without addressing time poverty, gender norms, and access to diversified livelihoods, these gains may not translate into sustainable empowerment. The paper calls for integrated policy measures, including gender-responsive agricultural support, public care infrastructure, skill development, and behavioral interventions to rebalance domestic responsibilities and facilitate women's transition to higher productivity sectors.

Keywords: Gender time use, participation in agriculture, paid work, multivariate regression, Gelbach decomposition method

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1. INTRODUCTION

Historically, the male labor force participation rate consistently surpassed that of the female labor force participation in India. However, recently, the labor market has witnessed a sharp increase in the rural women's labor force participation rate from 25 percent in 2017/18 to 48 percent in 2023/24.[1] A low and stagnant rural women's labor force participation reported before 2018 is often questioned, given that both the Periodic Labour Force Survey (PLFS) and Agriculture Census (2010/11 and 2015/16) show an overwhelming share of women farmers and women laborers engaged in farming.[2] Women's participation in agriculture is widely recognized, especially in livestock, but it is largely underestimated in the official statistics and hence goes unnoticed.

Women's work is largely invisible and is not accounted in the official statistics on national income. Further, women's work has been studied from the perspective of their participation, but the intensity of their participation has often been overlooked in the policy discourse. The persisting gender gaps in time spent on agriculture have significant implications on agricultural growth in India. Most of the debate around increasing labor force participation and feminization of agriculture revolves around data on their participation, but the duration of participation is not considered. This may be partly attributed to readily available data on labor force participation by the Government of India's National Sample Survey Office (NSSO) Periodic Labour Force Surveys. However, a narrative built only on participation may be far from truth (Doss (2011; Doss et al. 2018).

[1] This is prominent between 15 and 32 percentage points in Tripura, Assam and Arunachal Pradesh; 10 and 15 percentage points in Rajasthan, Puducherry, Uttarakhand, Manipur, J&K, Odisha, Madhya Pradesh, Meghalaya, Nagaland, Gujarat, West Bengal and Bihar; less than 10 percentage points in the remaining states (Sharma and Singh 2024; Goldar and Agrawal 2024).

2 The Agriculture Census (2010/11) shows that out of an estimated 118.7 million cultivators, 30.3 percent were females. Similarly, out of an estimated 144.3 million agricultural laborers, 42.6 percent were women. In terms of ownership of operational holdings, the Agriculture Census (2015/16) is startling. Out of a total 146 million operational holdings, the percentage share of female operational holders is only 13.87 percent (20.25 million) and shows almost a one percentage increase over five years period.

We draw on two Time Use Surveys (TUS)—2019 and 2024—to estimate gender participation in various economic activities (paid and unpaid) and understand changes in the nature of work over a span of five years (between 2019 and 2024). Additionally, our study focuses on empirically analyzing the socioeconomic factors that determine time use in each of the activities from a gendered lens. We test whether a reported increase in rural women's labor force participation rate (LFPR) is due to their spending more time in agriculture and allied activities. Our presumption is based on the fact that during the COVID-19 pandemic, a sizeable rural workforce fell back on farming for sustenance and might not have migrated to cities post-pandemic or at best, entrusted farm work to women. A detailed analysis of TUS helps quantify not only the time spent by rural men and women in various activities in a day and changes therein over time but also in understanding the nature of women's 'work' for possible interventions.

The paper is organized into four sections. Section I provides the study's context through a review of the existing literature. Section II details the data sources and methodological approach. Section III examines the participation of rural women and men in various activities, highlighting gender differentials and shifts in time allocation across the two reference periods. This analysis is complemented by an empirical assessment of individuals' time allocation, considering socioeconomic and structural factors such as income, land ownership, education, caste, and religion, from a gender perspective in Section IV. The paper concludes with a discussion of the broader policy implications.

2. THE CONTEXT AS PER THE EXTANT LITERATURE

According to Oxfam India, women are responsible for about 60–80 percent of food and 90 percent of dairy production, respectively. Their participation and contribution, though significant for economic growth, are hardly reflected in the official statistics. Using TUS data, Hirway and Jose (2011), Srija and Vijay (2021), Deb (2021), and Deshpande and Kabeer (2021) revealed how much of women's work in India is invisible because (a) women do work that *should* be classified as work based on the System of National Account (SNA) definitions but do not report their usual principal activity status as working, and (b) women do most of the unpaid domestic service work that does not qualify as "work" according to SNA definitions but is nonetheless critical to the economy and household welfare. Kamya (2023) constructed comparable estimates of women's work participation rate (WPR) from TUS 2019 and PLFS 2018–2023. She found the WPR of rural women to be almost double in the TUS because the PLFS is not able to capture a significant hidden contribution of women to the economy in the form of unpaid subsistence production. As per the TUS, the difference between women and men's contribution is alarming—women performed 88 percent of all unpaid care work compared to a contribution of only 12 percent by men. Similarly, women contributed 53 percent of all work in the economy, but their estimated share in paid work was barely 18 percent.

Vijayamba and Swaminathan (2024) opined that women's participation is widely recognized in agriculture, particularly in livestock raising, but it is underestimated in the PLFS and hence goes unnoticed. Socially and culturally, women are entrusted with family and child care, which limit their active participation in the labor market. Based on a small TUS in two villages of Karnataka and the national TUS 2019, the authors show that 11 percent of rural women participated in and spent an average of 16 hours a week on livestock raising. Women who are younger and more educated were less likely to engage in livestock raising,; this may be due to current technology and drudgery of work. The study further found that women's participation was higher in peasant households from privileged social groups than in the poorer wage worker households. Availability of information, technology, and extension services that are closer to homes and are at times convenient to women can enable their greater participation.

Using TUS 2019, Kumar et al. (2022) found that women contributed 53.2 percent of labor in the rural households compared to 46.8 percent by men. Rural women put in 1.6 hours more per day than men and hence have less time for learning, socialization, and self-care. Because of this, their participation in agriculture is lower (22.4 percent women versus 34.6 percent men), and so is their contribution (30.8 percent women versus 69.2 percent men). The authors argued that if the burden of unpaid domestic and care work is shared equally by men and women, the participation as well as contribution of women in agriculture will increase. This is possible only if institutional arrangements like *Anganwadi Kendras* (daycare centers) are developed in rural areas to take care of growing children.

While measurement and definitional issues under count women's work, low LFPR of rural women is further explained by both supply- and demand-side factor Li (2022) referred to Eswaran et al. (2013) and Afridi et al. (2018) to explain labor supply: income growth, in conjunction with social norms related to caste and education, leads to withdrawal from the labor force because jobs considered "suitable" for women are limited. In these cases, their income is no longer required. In contrast, the labor-demand explanation (e.g. Kapsos et al.2014, Chatterjee et al. 2015, Desai 2017, and Afridi et al. 2020, results from weak growth of paid employment and a substantial decrease in demand for agricultural labor driven by smaller farm sizes and mechanization. For both of these explanations, gender norms, particularly the unequal burden of domestic work and childcare, and restrictions on mobility can play a prominent role. According to Deshpande (2019) and Jayachandran (2020), low labor force participation of women ultimately reflects an imbalance between jobs that are deemed "suitable" or "desirable" for women and jobs that are available. Li (2022) further indicated that spillovers from the male labor market—by intensifying competition for paid work and substituting male for female work in self-employment activities—are important to understand trends in women's work. Similar to the PLFS, India's two TUS from 1998[3] and 2019 showed a decrease in hours worked by rural women (90 minutes a day, or a 36percent reduction) with two thirds of this decline

[3] Li (2019) combined the time-use pilot between July 1998 and June 1999 undertaken for six states (Gujarat, Haryana, Madhya Pradesh, Meghalaya, Orissa, and Tamil Nadu) and a nationally representative time-use survey in 2019.

being driven by fewer hours of paid work (53 minutes a day, or a 46 percent reduction). Time at work was replaced with activities typically classified as leisure, with the largest change being an increase in time spent watching TV (40 minutes a day).

The literature also provides explanations for both the decrease and increase in rural women's LFPR over different time periods. Mehrotra and Sinha (2017) attributed a fall in women's LFPR during the early 2000s to growing mechanization in agriculture and low education and skills of women, thereby leading to men taking over farming operations. Moreover, a rise in real wages in rural areas and the resultant improvement in the standard of living produced a strong negative income effect which outweighs the positive substitution effect. Among others, Abraham (2009), Himanshu (2011), and Deshpande (2023) argued that the economic challenges, such as declining household income and agrarian distress, push women to work. This is particularly true for women laborers. Generally, in poorer households, women are not truly engaged in work, and this is apparent from their considerable time spent in gathering fodder for animals, which is unpaid and unaccounted for in the official statistics. The COVID-19 pandemic added to households' troubles, forcing both men and women to devote more labor time to farm activities.

Goldar and Agrawal (2024), however, attributed higher rural women's LFPR to an increased desire of women for better living standards, higher educational attainment among girls, and changing social values and norms, that is, more willingness of male heads of rural households to accept women taking up employment outside the home. The study also reported an increase in women family workers replacing male workers on farms, which is associated with the households' aspirations for better opportunities and level of living. More than 50 percent of the increase in women's employment in agriculture involves women taking up farm jobs previously held by men, a trend popularly termed the '*feminization of agriculture*'. Chand (2024) focused on social welfare policies, such PM Kisan, noting that improvements in irrigation and water infrastructure behind a growing number of women workers in agriculture.[4] Using SAS 2012/13

[4] Availability of water under the Jal Jeevan Mission, might have reduced women's time on domestic chores, which can be seen as a positive change as they could contribute to production activities. Women can also fill gaps in agriculture created by men migrating to cities or as a result of households diversifying to allied activities, hence

and 2018/19, Bathla et al. (2025) reported an increase in the share of income from dairy, poultry, remittances, and wage labor in agricultural households. This is linked to household diversification into labor intensive work like animal husbandry, poultry, and beekeeping for which unpaid family labor may act as a reserve.

In this context, TUS has an edge over the NSSO labor force survey because it tracks the time spent by women and men in various paid and unpaid farm and off-farm activities and it surfaces the nature and intensity of work done by women in agriculture related activities.

paving the way for greater gender equality in the workforce.

3. DATABASE AND METHODOLOGY

3.1 Database

The TUS is comprehensive survey, providing valuable insights into how individuals navigate their daily lives and balance activities across work, leisure, and household responsibilities. It marked a significant step toward understanding the intricate dynamics of time allocation across different activities by men and women across India. The TUS 2019 covered a total of 138,799 households nationwide, including 82,897 households in rural areas and 55,902 households in urban areas. In the subsequent 2024 round, the survey covered 139,489 households nationwide, including 83,247 in the rural and 56,242 in urban areas respectively. For our purposes, we have restricted the data to rural households with individuals of working age, that is 15–59 years of age. Data are considered from both "normal days" and "other days" in the analysis. Further, from a total of 329,612 diaries, the total number of working-age individuals were 165,283 men and 164,399 women. In rural areas, 198,231 diaries were recorded from 98,292 men and 99,939 women. The same during restrictions were applied to the 2024 round: 332,874 diaries were recorded from a total of working-age individuals comprised of 165,879 men and 166,995 women. In rural areas, 205,741 diaries were recorded, including 100,775 men and 104,966 women.

The TUS is methodologically rigorous, adopting the International Classification of Activities for Time-Use Statistics 2016 (ICATUS, 2016). By including a detailed categorization, the survey data helpfully provide a nuanced exploration of how men and women allocate their time, which may be determined by factors such as their culture, socioeconomic status, age, and assets, among others. The data collected per activity are categorized using three-digit codes to ensure precise classification. The TUS focuses on the principal activity of an individual, noting time spent in farm work but without making any distinction between whether the individual is self-employed or a laborer.

The are nine groups of activities: 1 (Employment and related activities); 2 (Production of goods for own final use); 3 (Unpaid domestic services for household and family members); 4 (Unpaid caregiving services for household and family members); 5 (Unpaid volunteer, trainee, and other unpaid work); 6 (Learning); 7

(Socializing and communication, community participation, and religious practice); 8 (Culture, leisure, mass media, and sports practices); and 9 (Self-care and maintenance). We further combined these activities into four major categories, namely 1-2 as ‘work’; 3-5 as ‘domestic chores and caregiving’; 6 as ‘learning’; and 7-9 as ‘leisure’. While these categories provided an overarching framework, we also classified ‘work’ into agricultural and nonagricultural activities, with the former into subcategories—crop husbandry, livestock rearing, and forestry and fishing—using the three-digit activity codes as per paid and unpaid.

Table 1 presents summary statistics of individual- and household-level characteristics for the sample households in 2019 and 2024. The demographic profile shows a relatively young population with an average age of about 34 years and a modest increase in household size between 2019 and 2024. In terms of gender composition, marital status distributions are stable across the two survey years. The distribution of sample households across social groups also remained largely stable, with some increase in other backward castes. Notably, educational attainment improves between 2019 and 2024, as reflected by increases in both literacy and in secondary and higher education. Monthly per capita consumption expenditure rises substantially, suggesting improvements in living standards.

Asset ownership and housing quality also show positive changes, with a persistent dominance of marginal landholdings but an increase in pucca dwellings. Time-use patterns reveal a modest increase in total work time, driven mainly by paid and nonagricultural activities, while time spent on domestic chores and learning remains broadly stable. Within agriculture, participation in livestock activities increases slightly, whereas crop-related work shows a small decline. Overall, the table highlights gradual improvements in education, consumption, housing quality, and shifts in employment patterns between 2019 and 2024.

Table 1: Summary statistics of individual- and household-level variables

	2019		2024	
Variables	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Age (No. of years)	33.75	12.09	34.17	12.09
Household size (No.)	3.74	1.77	3.83	1.87
Gender (%)				
Male	49.58		48.98	
Female	50.42		51.02	
Marital status (%)				
Never married	24.19		24.19	
Currently married	71.57		71.66	
Widowed	3.72		3.63	
Divorced/separated	0.53		0.52	
Social Category (%)				
Schedule tribe	13.84		13.41	
Schedule caste	17.74		17.21	
Other backward caste	39.17		42.49	
Others	29.25		26.88	
Religion (%)				
Hinduism	78.52		78.65	
Islam	11.89		12.07	
Christianity	5.81		5.82	
Sikhism	1.60		1.43	
Others	2.18		2.03	
Education (%)				
Not literate	24.25		17.78	
Up to primary	20.82		20.33	
Upper primary/middle	19.84		19.85	
Secondary education	28.07		32.43	
Graduate and above	7.00		9.61	
Monthly per-capita consumption expenditure (Rs.)	2087.73	1301.39	2925.61	1539.78
Land Possessed (%)				
Marginal: <1ha	91.29		90.47	
Small: 1-2 ha	4.86		5.89	
Medium: 2-4 ha	3.07		2.71	
Large: >4 ha	0.79		0.93	
Dwelling type (%)				
Kutcha	12.46		8.18	
Semi-pucca	24.45		19.08	
Pucca	63.09		72.74	
Time use (minutes/day)				
Work	230.58	233.13	242.197	233.56
Domestic chores	196.36	204.53	198.5258	206.63
Learning	48.52	147.20	46.42538	143.23
Leisure	964.55	175.63	952.8308	170.81
Paid	***172.18***	***219.00***	***184.0502***	***209.07***
Unpaid	***58.40***	***106.27***	***58.14672***	***82.68***
Agriculture	***105.19***	***164.75***	***107.2034***	***163.56***
Crop	84.85	151.88	82.64741	148.17
Livestock	15.59	54.18	19.69323	58.72
Forestry/fishing	4.74	32.74	4.862716	31.25
Non-agriculture	***125.39***	***207.97***	***134.9936***	***212.03***

3.2 Regression Analysis and Gelbach Decomposition Method

Beyond descriptive analysis of the TUS, we use a Gelbach decomposition model to understand the contribution of different socioeconomic and demographic factors in the shifts in time allocation. Using the decomposition method helps estimate unconditional change in time allocation across four key activities—

work, domestic chores, learning, and leisure—and determine how much of this change can be attributed to compositional shifts in the observable characteristics. Each outcome variable is measured as the log-transformed daily minutes spent on the respective activity. The empirical exercise begins with a restricted (base) regression model that includes only a binary indicator for the year 2024 (coded 1 for 2024 and 0 for 2019):

$$y_{it} = \beta_{\text{basc}} \cdot \text{Year}_{2024} + \nu_{it}$$

where y_{it} represents the log time spent by individual i on a specific activity in year t, and β_{base} captures the unconditional average change in time use between 2019 and 2024.

To account for observable differences across individuals and households, a full model is estimated:

$$y_{it} = \beta_{\text{full}} \cdot \text{Year}_{2024} + \mathbf{x}_{it}'\gamma + \varepsilon_{it}$$

where x_{it} is a vector of covariates, including log-transformed age and household size, gender, marital status, caste (Scheduled Tribe, Scheduled Caste, OBC, Others), religion (Hinduism, Islam, others), education level (from no formal schooling to graduate and above), log monthly per capita consumption expenditure (MPCE), land ownership categories, dwelling type (kutcha, semi-pucca, pucca), and state fixed effects. The coefficient β_{full} captures the change in time use attributable to the year, or the net differences in these covariates.

To explain how much of the change in the year coefficient between the base and full models is attributable to specific sets of variables, the decomposition approach is used. We decompose the difference β_{base} - β_{full} into additive contributions from individual blocks of covariates based on the omitted variable bias formula. Specifically, it expresses the change as:

$$\beta_{\text{basc}} - \beta_{\text{full}} = \sum_{k} \eta_k \cdot \gamma_k$$

where γ_k represents the coefficient of variable k from the full regression, and η_k is the coefficient from a regression of covariate k on the year dummy and the remaining covariates. Grouping covariates thematically

by, for example, demographics, identity, education, or economic status, this method attributes the explained portion of the year effect to conceptually meaningful factors.[5]

To further explore heterogeneity in time-use changes, we apply the same approach separately to the subsamples of individuals engaged in agricultural and nonagricultural activities. This enables identification of sector-specific patterns in how different covariate groups contribute to changes in time allocation.

[5] The decomposition is implemented in Stata using the b1x2 command, which estimates the base and full models and performs decomposition in one step. Standard errors are clustered at the state level to account for within-state correlation. Sampling weights are applied to each regression to ensure population-representative estimates. However, consistent with Gelbach's methodological framework, the decomposition step is performed using unweighted regressions, as weights are not supported by b1x2 implementation and may violate the decomposition's mathematical properties.

4. RESULTS AND DISCUSSIONS

4.1 Participation and Time Use Pattern of Rural Women and Men in Major Activities

The TUS captures detailed information on individuals' daily engagement across twelve activity domains. For analytical clarity, we group these into four broad categories: (a) economic activities (work); (b) domestic chores and caregiving; (c) learning; and (d) leisure. Each category encompasses both paid and unpaid components. Table 2 presents gender-disaggregated participation rates and average time spent (in minutes) in rural areas for the years 2019 and 2024. Between 2019 and 2024, women's participation in economic activities rose from 39.0 percent to 42.1 percent, reflecting a modest but positive trend in their engagement with the workforce. Correspondingly, their average time spent on work increased from 92 to 99 minutes per day. Men, by contrast, exhibited a relatively stable participation rate—rising only slightly from 65.5 percent to 66.9 percent—with daily work hours increasing from 282 to 297 minutes.

Despite these changes, the gender gap in both participation and time allocation remains substantial. By 2024, men still spent nearly three times as much time on economic activities as women (297 minutes compared 99 minutes, respectively). This persistent disparity underscores structural barriers, including limited employment opportunities for women, lack of mobility, and entrenched gender norms. Domestic chores exhibit a strikingly stable and gendered pattern over time. In 2019, 84.2 percent of women participated in domestic tasks, compared to only 38.3 percent of men. By 2024, this pattern had hardly changed: 83.7 percent of women and 39.0 percent of men reported participation. In terms of time spent, women devoted approximately 286 minutes per day to domestic chores in 2024 (nearly identical to 287 minutes in 2019), while men showed a negligible decrease—from 41 to 38 minutes.

This temporal status reveals a lack of progress in redistributing unpaid domestic responsibilities within households, despite growing awareness and policy efforts aimed at promoting gender equity. The continued burden on women severely limits their time for income-generating activities and personal development.

Participation in learning activities—education, skill development, and training—has marginally changed over the five-year period. For men, the participation rate declined slightly from 24.1 percent to 23.2 percent, and time spent dropped from 102 to 96 minutes per day. Women's engagement rose modestly from 19.4 percent to 20.3 percent, with a small increase in time spent from 82 to 84 minutes. While the gender gap in learning is relatively narrow, the overall low levels of time investment by both men and women suggest that learning and skill formation remain secondary in rural time budgets. This has implications for long-term human capital development, particularly for women whose opportunities are further constrained by household responsibilities.

Leisure activities occupy the largest share of daily time use, with minimal variation between 2019 and 2024. Both men and women report leisure time exceeding 16 hours a day (as defined broadly to include socializing, resting, and passive activities), highlighting a significant allocation to nonproductive time. While high leisure time may reflect a lack of formal employment, particularly among women, it also suggests underutilization of potential time that could be directed toward productive or educational pursuits.

Table 2: Trends in gender participation (%) and time allocation (minutes) across activities

	Men		Women		All	
	2019	**2024**	**2019**	**2024**	**2019**	**2024**
Work	65.5	66.9	39.0	42.1	52.4	54.5
	(282)	(297)	(92)	(99)	(188)	(198)
Domestic chores & caregiving	38.3	39.0	84.2	83.7	61.0	61.5
	(41)	(38)	(287)	(286)	(162)	(162)
Learning	24.1	23.2	19.4	20.3	21.8	21.7
	(102)	(96)	(82)	(84)	(92)	(90)
Leisure	100.0	100.0	100.0	100.0	100.0	100.0
	(1015)	(1009)	(980)	(971)	(998)	(990)

Source: Estimated from unit-level data from TUS (2019 and 2024). Note: Figures in parentheses indicate time spent in minutes per day.

4.2 Time Use Patterns in Agricultural and Nonagricultural Activities in Rural India

Agriculture continues to be the primary occupation for a large proportion of India's rural population. However, the nature and intensity of engagement show notable gender disparities and regional variations, often shaped by the degree of industrialization and availability of alternative livelihood opportunities. In several states, women's higher engagement in agricultural work is largely driven by family-based farming

systems and lack of access to non-agricultural employment avenues. Table 3 presents all-India average time use patterns for agricultural and nonagricultural activities undertaken by rural households, disaggregated by gender and compared over time. As of 2024, 39.0 percent of rural men and 35.9 percent of rural women participated in agricultural work, reflecting a modest increase from 2019 (37.0 percent and 32.0 percent, respectively). While the gender gap remains, women's participation grown slightly faster. On average, men spent 118 minutes per day on agricultural activities compared to 67 minutes by women. Yet, even when disaggregated by sub-sector, crop production continues to be the dominant agricultural activity for both genders. Men's average time remained nearly unchanged (96 to 95 minutes), while women's time increased slightly from 42 to 45 minutes. Livestock-related activities show an increase in both participation and time use across genders. For both men and women, time spent rose by about 4–5 minutes, suggesting growing involvement in animal husbandry. Forestry and fishery remained minor in overall contribution but exhibited slight gains in participation, particularly for women (4.7 percent to 5.5 percent).

Nonagricultural work shows a distinctly different pattern. In 2024, 53.1 percent of rural men participated in nonagricultural activities compared to 17.1 percent of women, indicating a persistent gender divide. Notably, male participation in nonagricultural activities is higher than that of agricultural activities and rising over time (up from 49.1 percent in 2019), while women's participation remains low and largely stagnant.

In terms of time allocation, men spent 180 minutes per day in nonagricultural work, up from 168 minutes in 2019. Women's time remained unchanged at 32 minutes, indicating limited transition into nonfarm employment. This disparity underscores the limited mobility, low education and skill levels, and restrictive social norms that inhibit women's access to diversified employment opportunities outside agriculture.

Table 3: Trends in participation (%) and intensity of participation (minutes) in agricultural and nonagricultural work, 2019 and 2024

	Men		Women		All	
	2019	**2024**	**2019**	**2024**	**2019**	**2024**
1. Agriculture	37.0	39.0	32.0	35.9	34.5	37.4
	(114)	(118)	(59)	(67)	(87)	(92)
1.1 Crop	31.5	32.7	23.3	24.7	27.5	28.7
	(96)	(95)	(42)	(45)	(69)	(70)
1.2 Livestock	11.0	15.1	11.0	15.0	11.0	15.0
	(15)	(19)	(13)	(18)	(14)	(19)
1.3 Forestry & Fishery	2.1	2.1	4.7	5.5	3.4	3.8
	(3)	(3)	(4)	(4)	(3)	(4)
2. Non-agriculture	49.1	53.1	16.2	17.1	32.8	35.0
	(168)	(180)	(32)	(32)	(101)	(106)

Source: Estimated from unit-level data from TUS (2019 and 2024). Note : Figure in parentheses are per person time use in minutes per day.

Table 4 offers detailed insights into per capita daily time use (in minutes) for paid and unpaid work across agricultural and nonagricultural sectors in rural India, disaggregated by gender. The data reveal enduring gender disparities in labor contribution, particularly in the domain of unpaid work, though certain positive shifts are evident in women's paid work participation over time. In 2024, rural men spent an average of 237 minutes per day on paid work, compared to 62 minutes for women. Although women's paid work time increased from 55 minutes in 2019, the gender gap remains substantial. On the unpaid work front, women spent 37 minutes daily, almost equal to 36 minutes recorded in 2019. Men's unpaid work time remained largely unchanged at around 61 minutes. The total time commitment (paid + unpaid) also highlights the imbalance: men spent 297 minutes per day on work-related activities, while women spent 99 minutes. Though the increase in women's work time from 92 to 99 minutes is noteworthy, it remains significantly below men's total work time.

Table 4: Trends in time spent in paid and unpaid activities by rural men and women (minutes)

	Men		Women		All	
	2019	**2024**	**2019**	**2024**	**2019**	**2024**
			All			
Paid	222	237	55	62	140	149
Unpaid	60	61	36	37	48	49
Total	282	297	92	99	188	198
			Agriculture			
Paid	77	94	29	40	53	67
Unpaid	37	24	30	27	34	26
Total	114	118	59	67	87	92
			Crops			
Paid	70	83	26	32	48	58
Unpaid	26	12	16	12	21	12
Total	96	95	42	45	69	70
			Livestock			
Paid	5	9	3	7	4	8
Unpaid	10	10	10	11	10	11
Total	15	19	13	18	14	19
			Forest & Fishery			
Paid	2	2	0	0	1	1
Unpaid	1	1	3	4	2	3
Total	3	3	4	4	3	4
			Nonagriculture			
Paid	145	143	26	23	86	82
Unpaid	23	37	6	9	15	23
Total	168	180	32	32	101	106

Source: Estimated from unit -level data from TUS (2019 and 2024).

In agriculture, both men and women increased their paid work hours between 2019 and 2024. Men's paid time rose from 77 to 94 minutes, while women's rose from 29 to 40 minutes—a 22 percent and 38 percent increase, respectively—indicating a significant, albeit insufficient, shift in women's participation in income-generating agricultural activities. Unpaid work declined slightly for both genders, particularly among men (from 37 to 24 minutes), suggesting some transition from unpaid to paid roles. Within crop-related activities, men still dominate paid tasks, spending 83 minutes in 2024 compared to 32 minutes by women. However, unpaid work in crop production has halved for both genders over five years, possibly due to mechanization or better task specialization. Women's increased participation in paid work may also reflect growing recognition of their labor.

Livestock-related work shows near gender parity in total time use:, with women and men spending 18 minutes and 19 minutes per day, respectively. However, the split between paid and unpaid work still favors men. Both men and women spend 10–11 minutes on unpaid livestock activities. This relatively balanced

pattern suggests that animal husbandry may offer a more equitable space for gender participation, though income gaps likely remain. Time spent on forestry and fishery activities remains negligible and largely unpaid. Women's share of unpaid work (4 minutes) exceeds men's (1 minute), indicating that these activities, although minor, are often subsistence-level or informal, with little or no monetary return.

Men's engagement in nonagricultural work is both higher and more stable, spending over 180 minutes per day in 2024. Women, by contrast, spent only 23 minutes on paid work, down from 26 minutes in 2019. Although women's unpaid work increased slightly (from 6 to 9 minutes), their total engagement in nonagricultural work remained static at 32 minutes.

This lack of progress signals persistent barriers—including gender norms, lack of market access, and inadequate skills—that prevent rural women from entering nonfarm employment sectors. The TUS underscores the need for targeted interventions to facilitate women's access to off-farm livelihood opportunities.

4.3 Determinants of Shifts in Rural Time Use Patterns, 2019–2024

Table 5 presents the regression results, which clearly indicate a significant shift in how rural working-age individuals allocate their time. Between 2019 and 2024, there is a substantial increase in time spent on both work and domestic chores. Specifically, the coefficients for the year 2024 are 0.27 for work and 0.097 for domestic chores—both statistically significant—suggesting increased economic and domestic responsibilities. In contrast, there is a sharp decline in time spent on learning (−0.088) and a marginal but significant decline in leisure (−0.015), implying that developmental and discretionary activities may have been 'crowded out' during this period or may be achieved by both men and women.

Demographic characteristics such as age and household size show expected effects. Older individuals spend significantly more time working and less time learning, reflecting age-related responsibilities and declining engagement in educational pursuits. Larger households are associated with reduced time in work as well as domestic chores, possibly due to labor-sharing dynamics. Gender disparities are stark: women spend

significantly less time in paid work but more time in domestic chores, aligning with entrenched gender roles in rural India. They also participate less in leisure compared to men, pointing to a heavier overall time burden.

Marital status also matters: currently married individuals spend more time on both work and domestic chores but less on learning and leisure, possibly due to family and caregiving duties. Caste-based differences reveal that marginalized groups such as Scheduled Tribes (ST), Scheduled Castes (SC), and Other Backward Classes (OBC) spend significantly more time working and less time on developmental activities compared to the 'Others' category. This reinforces the time poverty and unequal access to opportunities among historically disadvantaged communities as highlighted by Jaggi and Gupta (2023).

Religion exerts mixed effects. Individuals from Islamic backgrounds report less time spent on work and more on domestic chores, while Hindu individuals show small and often insignificant differences. Education has a nonlinear relationship with time use. Higher education levels are associated with lower work hours but greater involvement in learning, especially at the secondary and tertiary levels. Household economic status is represented by MPCE and shows that as households become wealthier, work time decreases while time spent on learning increases. Finally, asset proxies such as landholding and dwelling type have significant implications. Larger landowners and those with better housing spend less time on domestic chores and more on other domains, indicating reduced domestic burdens.

Table 5: Determinants for time use change for those of working age in rural India, 2019 & 2024

Variables	(1) Work	(2) Work	(3) Domestic chores	(4) Domestic chores	(5) Learning	(6) Learning	(7) Leisure	(8) Leisure
Year: (2024 = 1 & 2019=0)	0.159***	0.270***	0.054	0.097*	-0.011	-0.088***	-0.012	-0.015*
	(0.037)	(0.048)	(0.057)	(0.050)	(0.020)	(0.012)	(0.007)	(0.007)
Age: (Log)		1.831***		0.091		-1.558***		0.041***
		(0.077)		(0.062)		(0.079)		(0.005)
Household Size (Log)		-0.174***		-0.380***		0.187***		0.013***
		(0.030)		(0.018)		(0.036)		(0.003)
Gender: Female (Base: Male)		-2.535***		3.430***		0.005		-0.033***
		(0.197)		(0.071)		(0.014)		(0.006)
Marital Status: (Base: Never Married)								
Currently married		0.593***		1.259***		-1.474***		-0.081***
		(0.079)		(0.053)		(0.121)		(0.004)
Social Category: (Base: Others)								
Schedule Tribe		0.520***		0.090***		-0.140***		-0.019***
		(0.071)		(0.022)		(0.025)		(0.007)
Schedule Caste		0.191***		0.059***		-0.113***		-0.009***
		(0.044)		(0.019)		(0.025)		(0.003)
Other backward class		0.180***		0.015		-0.044**		-0.008**
		(0.041)		(0.016)		(0.019)		(0.003)
Religion: (Base: Others)								
Hinduism		-0.065		0.042*		0.031		0.001
		(0.049)		(0.025)		(0.023)		(0.004)
Islam		-0.182**		0.080***		-0.158***		0.016***
		(0.070)		(0.028)		(0.048)		(0.004)
Education: (Base: No formal education)								
Up to primary		-0.036		0.152***		-0.164***		-0.001
		(0.031)		(0.020)		(0.017)		(0.002)
Upper primary/middle		-0.169***		0.097***		-0.026		0.000
		(0.048)		(0.035)		(0.064)		(0.003)
Secondary		-0.449***		0.096**		0.240***		0.004
		(0.046)		(0.036)		(0.067)		(0.003)
Graduate and above		-0.345***		0.323***		0.075		0.005
		(0.068)		(0.033)		(0.080)		(0.004)
Monthly per capita consumption expenditure (Log)		-0.158***		-0.157***		0.171***		0.002
		(0.035)		(0.014)		(0.014)		(0.002)
Land Possessed: (Base: Marginal<1ha)								
Small :1-2 ha		0.123***		0.004		0.043***		0.003
		(0.024)		(0.021)		(0.013)		(0.003)
Medium: 2-4 ha		0.111**		0.021		0.039*		0.006*
		(0.045)		(0.018)		(0.021)		(0.003)
Large: >4 ha		0.115**		0.035		-0.031		0.014***
		(0.056)		(0.026)		(0.036)		(0.004)
Dwelling Type: (Base: Katcha)								
Semi pucca		-0.101***		-0.064***		0.055***		0.006***
		(0.033)		(0.021)		(0.019)		(0.002)
Pucca		-0.277***		-0.122***		0.120***		0.011***
		(0.038)		(0.023)		(0.021)		(0.003)
State FE		Yes		Yes		Yes		Yes
Constant	3.524***	-0.007	3.668***	2.258***	0.681***	5.826***	6.855***	6.741***

Variables	(1) Work	(2) Work	(3) Domestic chores	(4) Domestic chores	(5) Learning	(6) Learning	(7) Leisure	(8) Leisure
	(0.124)	(0.384)	(0.078)	(0.236)	(0.026)	(0.300)	(0.006)	(0.025)
Observations	403,880	401,942	403,880	401,942	403,880	401,942	403,880	401,942
R-squared	0.001	0.327	0.000	0.538	0.000	0.383	0.001	0.054

Source: Authors' estimates based on unit -level data from TUS (2019 and 2024); Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.4 Sources of Time Use Change Based on Gelbach Decomposition

To unpack the sources of time-use change, a Gelbach decomposition helps deconstruct how much of the observed change in 2024 can be attributed to shifts in the demographic, social, and economic characteristics. The decomposition indicates that only part of the observed increase in work time (total change = −0.109) is explained by measured characteristics, with the rest attributed to unexplained or residual factors. MPCE, dwelling type, and education account for the largest negative contributions to work time, suggesting that rising incomes and improved living conditions would have led to lower work intensity. However, the actual increase implies countervailing external forces—possibly economic stress or livelihood restructuring—that push people into more work despite improvements in endowments.

In domestic chores, the predicted change is −0.051, again suggesting that improved socio-economic conditions should have reduced domestic burdens. But the overall regression exercise showed a positive shift, implying increased care responsibilities or withdrawal from outside work, especially for women. Learning time shows a predicted increase (0.070), largely driven by gains in MPCE and education. However, we find a decline, highlighting the role of unobserved constraints such as digital divides, reduced schooling access, or household shocks. For leisure, the predicted change is minimal (0.003), and this aligns with the near-flat observed trend, indicating that leisure is relatively resistant to the compositional shifts.

Table 6: Gelbach decompositions of time use changes for those of working age in Rural India, 2019 & 2024

Variables	(1) Work	(2) Domestic Chores	(3) Learning	(4) Leisure
Age	0.026***	0.002*	-0.022***	0.001***
	(0.005)	(0.001)	(0.005)	(0.000)
Household Size	-0.009***	-0.019***	0.009***	0.001***
	(0.003)	(0.004)	(0.003)	(0.000)
Female	-0.015**	0.020***	-0.000	-0.000***
	(0.006)	(0.007)	(0.000)	(0.000)
Married	0.001	0.001	-0.001	-0.000
	(0.004)	(0.008)	(0.009)	(0.001)
Caste	0.004	0.000	-0.001	-0.000**
	(0.003)	(0.001)	(0.001)	(0.000)
Religion	-0.000	0.000	-0.000	-0.000
	(0.001)	(0.000)	(0.001)	(0.000)
Education	-0.027***	0.012***	0.012**	0.000
	(0.004)	(0.002)	(0.005)	(0.000)
MPCE	-0.055***	-0.062***	0.061***	0.001
	(0.012)	(0.007)	(0.005)	(0.001)
Land	0.002	0.000	0.000	0.000
	(0.002)	(0.000)	(0.000)	(0.000)
Dwelling	-0.028***	-0.010***	0.011***	0.001***
	(0.005)	(0.003)	(0.002)	(0.000)
State	-0.007*	0.005	0.001	0.000
	(0.004)	(0.004)	(0.003)	(0.000)
Total Predicted Change	-0.109***	-0.051***	0.070***	0.003***
	(0.024)	(0.013)	(0.023)	(0.001)
Observations	402,034	402,034	402,034	402,034

Source: Authors' estimates based on unit -level data from TUS (2019 and 2024): Note: Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

4.5 Sectoral Differences in Time Use: Agriculture vs. Nonagricultural Activities

Distinct patterns emerge when time-use changes are analyzed separately for agricultural and nonagricultural activities in rural India. As shown in Table 7, the time spent on agricultural work increased significantly between 2019 and 2024. The coefficient for the year variable rose from 0.139 to 0.284, indicating a substantial intensification of labor in farm activities, even after accounting for individual and household characteristics.

Table 7: Time use change in agricultural and nonagricultural activities in rural India, 2019 & 2024

Variables	(1) Agriculture	(2) Agriculture	(3) Nonagriculture	(4) Nonagriculture
Year: (Base 2019 = 0) & 2024 =1	0.139**	0.284***	0.149***	0.165***
	(0.054)	(0.063)	(0.026)	(0.022)
Age: (Log)		1.416***		1.008***
		(0.098)		(0.133)
Household Size (Log)		-0.153***		-0.092***
		(0.038)		(0.024)
Gender: Female (Base: Male)		-0.622***		-2.618***
		(0.132)		(0.125)
Marital Status: (Base: Never Married)				
Currently married		0.274***		0.450***
		(0.066)		(0.077)
Social Category: (Base: Others)				
Schedule Tribe		0.515***		0.202***
		(0.088)		(0.046)
Schedule Caste		-0.110		0.334***
		(0.075)		(0.048)
Other backward class		0.075		0.172***
		(0.063)		(0.037)
Religion: (Base: Others)				
Hinduism		-0.141		0.025
		(0.104)		(0.048)
Islam		-0.640***		0.251***
		(0.157)		(0.085)
Education: (Base: No formal education)				
Up to primary		-0.248***		0.133***
		(0.051)		(0.023)
Upper primary/middle		-0.444***		0.104**
		(0.086)		(0.051)
Secondary		-0.752***		-0.018
		(0.110)		(0.049)
Graduate and above		-1.320***		0.440***
		(0.137)		(0.065)
Monthly per capita consumption expenditure (Log)		-0.190***		-0.030
		(0.069)		(0.032)
Land Possessed: (Base: Marginal<1ha)				
Small :1-2 ha		0.852***		-0.413***
		(0.036)		(0.034)
Medium: 2-4 ha		0.960***		-0.461***
		(0.060)		(0.050)
Large: >4 ha		1.016***		-0.526***
		(0.068)		(0.056)
Dwelling Type: (Base: kutcha)				
Semi pucca		-0.120***		-0.015
		(0.032)		(0.039)
Pucca		-0.413***		0.001
		(0.040)		(0.052)
State FE		Yes		Yes
Constant	2.068***	-0.113	2.174***	-0.410
	(0.128)	(0.727)	(0.114)	(0.555)
Observations	403,880	401,942	403,880	401,942
R-squared (value of 0.001 is too low?)	0.001	0.174	0.001	0.287

Source: Authors' estimates based on unit -level data from TUS (2019 and 2024;)Note: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The Gelbach decomposition results (Table 8) suggest that this increase is largely influenced by changes in education, monthly per capita consumption expenditure (MPCE), and dwelling type. Specifically, education and MPCE result in a time-use coefficient of −0.069, suggesting that improvements in education levels and living standards reduce time spent on agricultural work. However, the observed rise in labor intensity indicates underlying livelihood shocks or structural shifts in rural employment patterns. The period between 2019 and 2024 includes the COVID-19 pandemic, which may have disrupted nonfarm employment opportunities, prompting a fallback on agriculture for subsistence and livelihood security.

The positive coefficients for landholding categories further corroborate this trend. Compared to marginal landholders (<1 ha), individuals with larger landholdings (1–2 ha, 2–4 ha, and >4 ha) allocate significantly more time to agricultural activities. This outcome is consistent with the expectation that households with greater land access are more directly engaged in cultivation, either through their own labor or through supervisory roles. The positive association reflects the scale of agricultural operations and possibly the intensification of family labor use when labor markets are uncertain.

In the nonagricultural sector, the time-use coefficient for the year 2024 remains positive but is relatively modest (0.165). In this sector, education has a positive and significant contribution, indicating that better-educated individuals are more likely to engage in nonfarm work. Caste also emerges as an important determinant, with Scheduled Castes and Other Backward Classes spending more time in nonagricultural activities compared to the ‘Others’ category. In contrast, landholding is negatively associated with time spent in nonagricultural work, implying that land-rich households are less dependent on off-farm income sources. This is consistent with patterns of wealth-driven occupational choices, where better-endowed households prioritize agricultural and asset-based incomes over wage or petty nonfarm employment.

Notably, the overall predicted change in nonagricultural time use is negligible (−0.010), implying that much of the observed variation is driven by residual or unobserved factors not captured in the model. These may include local labor market dynamics, informal sector growth, migration, skill mismatches, or policy interventions affecting employment patterns.

Regarding the low R-squared values (0.174 for agriculture and 0.287 for nonagriculture), it is important to note that such outcomes are common in time-use regressions, given the inherent complexity and heterogeneity of labor allocation decisions. Individual choices around time use are influenced by diverse factors such as local infrastructure, social norms, labor demand fluctuations, and personal preferences, many of which remain unmeasured in large-scale surveys.

In summary, while socioeconomic improvements in education and living standards are typically expected to reduce reliance on agricultural labor, the actual increase in time spent on farming suggests a reversion to agriculture in response to economic uncertainties. In contrast, the nonagricultural sector has seen muted changes, with structural shifts possibly constrained by barriers to nonfarm employment, particularly for disadvantaged social groups.

Table 8: Gelbach decomposition of time use changes in the agriculture and nonagriculture sectors in rural India, 2019 & 2024 (15–59 years old)

Variables	(1) Agriculture	(2) Nonagriculture
Age	0.019***	0.015***
	(0.004)	(0.004)
Household size	-0.007***	-0.005***
	(0.002)	(0.002)
Female	-0.004**	-0.015**
	(0.002)	(0.006)
Married	0.000	0.000
	(0.002)	(0.003)
Caste	0.000	0.005**
	(0.004)	(0.002)
Religion	-0.001	0.001
	(0.002)	(0.001)
Education	-0.069***	0.014***
	(0.008)	(0.004)
MPCE	-0.062***	-0.012
	(0.021)	(0.013)
Land	0.010	-0.005
	(0.010)	(0.005)
Dwelling	-0.043***	0.002
	(0.006)	(0.005)
State	-0.001	-0.010*
	(0.006)	(0.005)
Total predicted change	-0.158***	-0.010
	(0.028)	(0.022)
Observations	402,034	402,034

Source: Authors' estimates based on unit -level data from TUS (2019 and 2024;); Note: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. KEY CONCLUSIONS

In the backdrop of a sharp rise in labor force participation of rural women from 25 percent in 2017/18 to 48 percent in 2023/24, this study investigated changes in time allocation across agricultural and non-agricultural activities (paid and unpaid) using the two nationally representative Time Use Surveys from 2019 and 2024. This period was marked with a mass migration of labor from urban to rural areas due to the COVID-19 pandemic. Significant shifts in the rural labor markets have also been identified since then, particularly a resurgence of interest in agriculture and livestock activities.

The analysis draws on over 400,000 individual diaries using a mixed-methods approach that includes multivariate regression and Gelbach decomposition to empirically estimate the determinants of time use and the contribution of various factors.

The findings indicate a modest but significant rise in rural women's participation in economic activities, particularly in the paid agricultural and livestock domains, which is consistent with a surge in rural women's labor force participation rate. The share of women participating in agriculture increased from 32.0 percent to 35.9 percent, and their time in paid agricultural work rose by 38 percent over five years. However, these gains coexist with persistently high time burdens in unpaid domestic work, which remain virtually unchanged at nearly 5 hours per day. The gender disparity in domestic responsibilities continues to exceed 85 percent, limiting women's capacity to diversify into nonagricultural employment or invest in skill formation. Time use in nonagricultural work remains largely male-dominated, with women averaging just 32 minutes daily—unchanged since 2019—while men's participation and intensity continue to rise.

Regression results highlight that time use is significantly shaped by gender, landholding size, income, education, and caste. From the analysis, we find a complex picture of gender participation and time devoted to economic activities (agricultural and nonagricultural work), domestic chores, learning, and leisure. The evidence underscores that the recent increase in rural women's labor force participation in India is not merely a statistical anomaly but reflects a real and context-driven increase in women's engagement in

agriculture and allied activities. Yet, this increased participation has not led to a commensurate shift in gender norms or time burdens. Women remain confined to time-intensive, unpaid domestic roles, and their transition to higher productivity, nonagricultural work remains limited. These patterns highlight the limitations of using participation rates alone as indicators of gender empowerment or labor market inclusion. The persistence of gendered time poverty, coupled with limited diversification into nonfarm employment, calls for structural transformation.

To achieve inclusive rural development and gender-equitable growth, policy responses must go beyond labor market inclusion to address the quality and context of women's work. These include (i) time-sensitive and gender-responsive agricultural support, including training in low-drudgery farm technologies, livestock care, and extension services; (ii) expansion of public care infrastructure, such as rural childcare centers, to redistribute unpaid care work; (iii) flexible credit and input delivery mechanisms including hiring of machinery tailored to women's mobility and time constraints; (iv) behavioral interventions and community-based programs to promote male participation in domestic tasks; (iv) greater integration of time use data into development planning and labor policy formulation; and (v) conduct in-depth studies, disaggregated at the state level, to provide a nuanced picture on women farmers and ways to increase their work participation with dignity.

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