

Three Decades of Women's Employment in Rajasthan: Trends, Determinants, and Structural Shifts (1993–2023)

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Abstract

This paper examines trends and determinants of female labour force participation rate (FLFPR) in Rajasthan over three decades, from 1993–94 to 2023–24, using unit-level data from the National Sample Survey Organisation's Employment and Unemployment Surveys (NSSO EUS) and the Periodic Labour Force Surveys (PLFS). Rural FLFPR followed a non-linear path: it fell from a peak of 702.6 per 1,000 women in 1993–94 to a low of 325.7 in 2017–18, and then rose sharply to 620.0 by 2023–24. Urban female participation stayed below rural levels across the entire period. A regression analysis for 2023–24 identifies household job count, age (particularly the 30–44 cohort), and graduate-level education as the strongest predictors of participation. The results also point to an education–employment paradox: women with secondary education participate less than both those with sub-middle-level education and graduates, suggesting that intermediate education creates a “reserve force” of women who are neither absorbed into the labour market nor content to remain outside it. Caste-based patterns show higher participation among SC/ST women than among OBC and General Category women, pointing to participation driven by economic necessity rather than opportunity among marginalized groups. The paper recommends targeted investment in infrastructure and

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market-aligned skill development, with emphasis on the needs of rural and SC/ST women.

Keywords: Female Labour Force Participation; Rajasthan; NSSO; PLFS; Logistic Regression; Caste; Rural-Urban Divide

1. Introduction

Female labour force participation (FLFP) is one of the most debated fields of the development economics. Across developing countries, the relationship between women's participation in labour force and processes of economic transformation, demographic transition, and social change is very complex. India, as a very important country of South Asia, comes across with a very interesting paradox. Though India has made significant stride in the field of female education and had achieved significant decline in fertility rates, female LFPR has remained strikingly low and exhibits a persistent downward trend (World Bank, 2023; International Labour Organization [ILO], 2022).

Within this narrative in India, Rajasthan as India's largest state by area, characterised by a predominantly agrarian economy, seasonality of agricultural employment and a heavy reliance on unpaid family labour, occupies a position that extends well beyond its sheer demographic weight. Simultaneously, the state is also characterised by deep-rooted patriarchal norms, practice of female seclusion in the form of *purdah*, child marriage, and spatial mobility restrictions that have suppressed women's participation in the formal labour market (Olsen & Mehta, 2006; Jeffery & Basu, 1996).

The literature on FLFPR in India is huge and has grown considerably since 1991, yet it is disproportionately focused at the national level and is limited to high-growth states such as Maharashtra, Tamil Nadu, and Gujarat. State-level analyses encompassing FLFP dynamics over three decades — and that integrate the granular household survey data now made available through the Periodic Labour Force Survey (PLFS) — remain comparatively rare. This gap is consequential for policy, given that the determinants and structural barriers to female employment differ markedly across India's agro-climatic, cultural, and economic regions.

The present study addresses this gap directly. Using unit-level data from six rounds of the NSSO Employment and Unemployment Surveys (1993-94 to 2011-12) and PLFS (2017-18 and 2023-24), covering women aged 15–64, it pursues four interrelated objectives: first, to document and analyse temporal trends in female LFPR across rural and urban Rajasthan; second, to examine the changing structure of female employment by job type and informality status; third, to assess socio-economic and educational differentials in participation by caste and education level; and fourth, to identify the key determinants of female LFPR in 2023-24 using binary logistic regression models estimated separately for rural and urban sub-samples. Together, these analyses provide a longitudinal, multi-dimensional perspective on women's employment in Rajasthan that is, to the authors' knowledge, without precise precedent in the existing literature.

The remainder of this paper is structured as follows. Section 2 reviews the relevant theoretical and empirical literature. Section 3 describes the data sources and econometric methodology. Section 4 analyses trends in LFPR and employment structure. Section 5 discusses and interprets the regression results. Section 6 explains the findings in broader literature and structural context. Section 7 recommends policy implications, and Section 8 concludes the paper.

2. Review of Literature

The literature related to determinants of female labour force participation has grown significantly both at theoretical and empirical level. At the theoretical level, neoclassical economists puts labour supply decision as a function of the reservation wage which itself depends upon the household income, the marginal utility of leisure, and the opportunity cost of unpaid work at household level (Mincer, 1962; Becker, 1965). As household incomes rise, the income effect of greater wealth reduces the necessity of paid employment outweighing the substitution effect of higher wages that incentivises work. This is the famous 'backward-bending' labour supply curve (Mincer, 1962). Neoclassical theory framework when applied to female employment in developing economies generates the hypothesis that FLFP declines in the initial stages of economic development with the rise in male income, and recovers at higher income levels when labour-saving

technologies and formal childcare reduce the cost of female employment (Goldin, 1995; Mammen & Paxson, 2000).

The empirical literature on India has engaged intensively with the U-shaped hypothesis. Kapsos, Silberman, and Bourmpoula (2014) and Mehrotra and Parida (2017) provide evidence consistent with this pattern at the national level, documenting that declining FLFP between 2004-05 and 2011-12 reflected, in part, rising male incomes in agricultural households enabling women to withdraw from distress-driven self-employment. However, Himanshu (2011) and Ghosh (2009) emphasize that such withdrawals frequently represent a shift from paid to unpaid household labour rather than a genuine improvement in welfare or autonomy. The period from 2011-12 to 2017-18, is characterised by a steep decline in both national and Rajasthan-specific FLFP, and has generated a vibrant debate regarding the relative contributions of measurement methods versus genuine structural changes (Abraham, 2017; Deshpande & Singh, 2021).

The intersection of caste and gender in shaping labour market participation has also received increasing attention and is widely analysed by various scholars. Thorat and Attewell (2007) have studied the role of social discrimination in regulating upward occupational mobility for Dalit workers of both sexes, while Jodhka (2014) highlights the heterogeneous economic path of different Scheduled Caste communities. The empirical evidence suggests that Scheduled Caste and Scheduled tribe (SC/ST) women participation in the labour force is significantly higher than General category women. This cannot be attributed to superior opportunity but to greater economic compulsion of lower average household incomes of SC/ST (Klasen & Pieters, 2015; Borooah, 2005). This compulsion-driven participation has important implications, and complicates straightforward interpretations of high LFPR as an indicator of empowerment.

The relationship between female education and employment is theoretically ambiguous and empirically complex. Human capital theory predicts a positive monotonic relationship: higher education increases productivity, reduces information asymmetries in the labour market, and raises the opportunity cost of non-participation (Becker, 1964). However, in the Indian context, multiple studies have documented a non-linear, U-shaped relationship between education and FLFP: participation is high among illiterate women (who are often constrained to take up unskilled agricultural or domestic work), declines at

intermediate education levels (when educated women — and their families — hold higher occupational aspirations but face limited suitable formal employment opportunities), and rises again at graduate and post-graduate levels (Klasen & Pieters, 2015; Mehrotra & Parida, 2017). Chatterjee, Murgai, and Rama (2015) term this the “education-employment mismatch”, a structural feature of Indian labour markets particularly acute in conservative social contexts such as Rajasthan.

State-level studies on Rajasthan’s female labour market remain relatively sparse. Olsen and Mehta (2006) provide a richly contextualised analysis of gender, work, and caste in rural Rajasthan, emphasising the role of mobility constraints and social norms in deterring formal-sector participation. More recent analyses using PLFS data (Drèze & Khera, 2021; NSO, 2023) confirm the state’s persistently low urban female LFPR but offer limited longitudinal or multivariate analysis. The present paper advances beyond this literature by providing a systematic multi-decade, multi-method analysis that integrates the 2023-24 PLFS round — the most current nationally representative employment survey available at the time of writing.

3. Data and Methodology

3.1 Data Sources

This study draws upon six rounds of nationally representative household survey data. The first four rounds — 1993-94 (50th Round), 1999-2000 (55th Round), 2004-05 (61st Round), and 2011-12 (68th Round) — are sourced from the Employment and Unemployment Surveys (EUS) conducted by the National Sample Survey Organisation (NSSO). The latter two rounds — 2017-18 and 2023-24 — utilise data from the Periodic Labour Force Survey (PLFS) conducted by the National Statistical Office (NSO). All six surveys employ stratified multi-stage sampling designs and provide unit-level (household and individual) microdata, enabling a consistent longitudinal analysis across three decades. For our study, we have restricted the sample to women between the age of 15–64 years, residing in Rajasthan, comprising, in both rural and urban areas.

3.2 Variable Construction

Labour Force Participation is taken as dependent variable and is defined as a categorical binary indicator dummy equal to unity if the woman reports being either currently employed or actively seeking employment (unemployed) during the reference week, and zero otherwise. The FLFP definition is consistent with the standard International Labour Organization (ILO definition adopted in NSSO/PLFS surveys).

Key independent variables are: (i) educational attainment— Illiterate/Middle, Secondary / Senior Secondary, and Graduate and Above. Secondary/Senior Secondary is treated as the reference category) (ii) caste category, SC/ST taken as reference category, OBC, and General; (iii) age group, 15–29 years as reference category, 30–44 years, and 45–64 years; (iv) marital status, Currently Married (reference category), Unmarried, and Widow/Divorced; and (v) residential sector, Rural as reference category and Urban sector.

Household-level economic status is measured through Monthly Per Capita Consumption Expenditure (MPCE), and is constructed by dividing total monthly household consumption expenditure (MHCE) by household size: ($MPCE = MHCE \div \text{Household Size}$). This transformation ensures comparability of welfare standards across households of varying sizes. Given the complex stratified sampling design of NSSO/PLFS surveys, MPCE quintile thresholds are computed using household weights (hhwt), analogous to weighted percentile estimation. Individuals are then divided into three socio-economic groups: the Bottom 40%, the Middle 40% which is used as the reference category, and the Top 20% (above the 80th percentile). A household job count variable is constructed, that captures the number of currently employed members, to account for intra-household employment dynamics.

3.3 Econometric Model

To analyse the determinants of female labour force participation, a binary logistic regression model is estimated using unit-level data from PLFS 2023–24. The dependent variable takes the value 1 if a woman participates in the labour force and 0 otherwise. The

logit models estimates the log-odds of participation as a linear function of socio-economic and demographic covariates, allowing estimation of the probability of labour force participation conditional on individual and household characteristics.

$$\log[P_i / (1 - P_i)] = \alpha + \sum \beta_j X_{ij} \quad (1)$$

where P_i is the probability that woman i participates in the labour force, α is the intercept, X_{ij} is the j -th explanatory variable, and β_j is the corresponding coefficient. Results are reported as Odds Ratios, which indicate the multiplicative change in the odds of participation in labour force associated with a unit change in the predictor, keeping all other variables constant. We have estimated three models: 1) a pooled model (both rural-urban combined sample), 2) a rural sub-sample model, and 3) an urban sub-sample model. This helps us in comparison of determinants across the residential sectors.

4. Results and Analysis

4.1 Trends in Female LFPR and the Gender Gap

Table 1 presents female and male LFPR and unemployment rates for females aged 15–64 across six survey rounds and is disaggregated at rural and urban sector level. It captures the trends of female LFPR in Rajasthan over the study period. The first phase (1993-94 to 2004-05) is relatively stable with high levels of LFPR: rural female LFPR fluctuates between 625 and 703 per 1,000, reflecting the dominance of agricultural self-employment and unpaid family labour. During this period, the overall gender gap in LFPR was substantial.

The second phase (2004-05 to 2017-18) is dramatic and registers decline in FLFPR. Rural female LFPR fell from 668.1 in 2004-05 to just 325.7 in 2017-18, a decline of more than 50% within thirteen years. The decline in urban female LFPR was even more pronounced. It declined from 302.3 to a historic low of 154.6 per 1,000. The rural gender gap widened to an extreme 452.0 per 1,000 in 2017-18. This period also coincides with the implementation of MGNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme) that was instrumental in raising agricultural wages. Rise in household income because of increased wages in agriculture sector may have pulled some women to

withdraw from distress-driven employment. Methodological differences between the PLFS and the earlier EUS are also likely contributors to the apparent magnitude of this decline (Abraham, 2017).

Table 1: Labour Force Participation and Unemployment Rates by Gender and Sector (Per 1,000), Age Group 15–64

Survey Year	LFPR – Male	LFPR – Female	LFPR – Overall	Gender Gap (LFPR)	UR – Male	UR – Female	UR – Overall	Gender Gap (UR)
A. Rural								
1993-94	897	702.6	799.8	194.4	4.1	1.2	2.7	2.9
1999-2000	875.2	625.9	750.6	249.3	6.4	1.3	3.9	5.1
2004-05	873.9	668.1	771	205.8	12.6	0.9	6.7	11.7
2011-12	794.3	531.3	662.8	263.1	8.9	3.5	6.2	5.3
2017-18	777.6	325.7	551.6	452	68.2	12.3	40.2	55.9
2023-24	830.2	620	725.1	210.2	43.7	31.5	37.6	12.2
B. Urban								
1993-94	804.7	251.9	528.3	552.8	17.7	5	11.3	12.7
1999-2000	785.8	218.7	502.2	567.1	27.7	28.7	28.2	-1
2004-05	804.4	302.3	553.3	502.1	29.5	30.5	30	-1
2011-12	745.7	209.3	477.5	536.4	32.2	25.2	28.7	7.1
2017-18	751.7	154.6	453.1	597.1	70.1	102	86	-32
2023-24	768	319.2	543.6	448.9	71.7	113.6	92.7	-41.9
C. Overall								
1993-94	874.3	597.3	735.8	277	7.2	1.6	4.4	5.6
1999-2000	852.4	531.7	692	320.7	11.4	3.9	7.7	7.5
2004-05	855.9	579.5	717.7	276.4	16.7	4.6	10.7	12.1
2011-12	781.6	451.9	616.8	329.7	14.7	6	10.4	8.7
2017-18	771	285	528	486	68.6	23.8	46.2	44.8
2023-24	811.3	536.8	674.1	274.5	51.8	45	48.4	6.7

Note: Authors' calculation based on NSSO EUS and PLFS unit-level data. Gender Gap = Male LFPR – Female LFPR. For OBC, data was not collected as a separate category in 1993-94.

The third phase (2017-18 to 2023-24) is marked by recovery in female LFPR. Rural female LFPR rebounded to 620.0 per 1,000 by 2023-24, and the rural gender gap narrowed significantly to 210.2 per 1,000. This was the smallest recorded during the study period. Urban female LFPR also recovered to 319.2 per 1,000, though the urban gender gap remained at high levels at 448.9. The unemployment rate among urban women rose to 113.6 per 1,000 in 2023-24, exceeding that of urban men (71.7 per 1,000).

This development indicates a substantial mismatch between demand and available opportunities in urban labour markets.

4.2 Social and Educational Differentials in Female LFPR

Table 2 discusses female LFPR by social group and by educational attainment across survey rounds and residential sectors.

Table 2: Female LFPR (per 1,000) by Social Group and Educational Category, Age Group 15–64

Survey Year	SC/ST	OBC	General	Overall	Primary Level	Secondary Level	Graduate Level
A. Rural							
1993-94	782.9	—	662.2	702.6	717.9	324.2	718.6
1999-2000	700.6	662.9	490.6	625.9	650.5	288	338.3
2004-05	723.3	695.7	464.9	668.1	697.2	400.3	548.1
2011-12	609.7	511.5	398.4	531.3	595.8	258.8	432.4
2017-18	368.5	311	249.8	325.7	393.6	142.7	224.2
2023-24	652.3	628.6	498.6	620	774	393.3	573.9
B. Urban							
1993-94	338.2	—	232.6	251.9	294.3	114.9	356
1999-2000	336.2	241.1	160.4	218.7	264.4	114	282.7
2004-05	404.6	302.1	243.4	302.3	371	160	336.3
2011-12	262.6	256.8	122.4	209.3	260.1	105.5	289.3
2017-18	191.3	164.3	117.7	154.6	172.5	87.1	247.1
2023-24	341.1	338.5	262.8	319.2	428.2	162.2	419.1
C. Overall							
1993-94	719.3	—	545.1	597.3	642.8	184.3	403.1
1999-2000	642.7	592.6	372.4	531.7	588.7	185.2	287.6
2004-05	666.9	623.1	364.8	579.5	640.4	278.4	361.6
2011-12	554.9	455.2	272.4	451.9	538.1	198.4	342.1
2017-18	340.8	279.5	189.8	285	358.8	124.5	237.5
2023-24	583.5	553.2	396.1	536.8	703	324	496.9

Note: Authors' calculation based on NSSO EUS and PLFS unit-level data. OBC data is unavailable for 1993-94 as the category was not identified separately in the 50th Round.

An analysis of Table 2 shows that social category-based differences in female LFPR are visible across all survey rounds and residential sectors. SC/ST women exhibit systematically higher LFPR rates than OBC and General Category women throughout the study period. In rural areas in 2023-24, SC/ST LFPR stood at 652.3 per 1,000, compared to 628.6 for OBC and 498.6 for General category women. In urban areas, differential is even steeper: SC/ST LFPR (341.1) significantly exceeded General category LFPR (262.8). This pattern reflects the compulsion-driven character of employment among economically marginalised groups. Non-participation in the labour force causes significant welfare costs to the marginalised groups.

The educational differentials in Table 2 reveal the “education-employment paradox” which is a special characteristic of Rajasthan’s female labour market. Women with Primary-level education consistently record the highest LFPR throughout survey period. In 2023-24, their overall LFPR was 703.0 per 1,000, compared to 324.0 for Secondary-educated women and 496.9 for Graduate-level women. This U-shaped pattern with the lowest participation rates observed at intermediate education levels is a consistent feature across rural and urban areas throughout the entire study period. The withdrawal of females from labor force at the Secondary education level suggests that secondary schooling generates aspirations for formal, white-collar employment without matching qualifications required to access formal and white-collar employment.

4.3 Structure and Quality of Female Employment

Table 3 reveals the most striking feature of the employment structure that is the overwhelming and persistent dominance of unpaid family labour throughout the study period. In 1993-94, 57.0% of employed women in Rajasthan were engaged as unpaid family workers, which rose to 64.2% by 1999-2000 before declining to 53.2% in 2023-24. This pattern reflects labour force participation of involuntary and remuneration-free character. Regular salaried employment, the employment category most associated with job security and social protection, has expanded from just 3.0% in 1993-94 to 8.8% in 2023-24. While this near-trebling of the regular employment share reflects progress, the absolute level of employment remains very low. The vast majority of employed women

are engaged in informal, insecure, or unpaid work. The casual labour share has remained stable, and has fluctuated between approximately 10% and 20%. Self-employment has also oscillated between 21.7% and 28.1%, reflecting the expansion of home-based informal enterprises observed in post-pandemic surveys.

**Table 3: Distribution of Female Workers by Employment Type
(%), Age Group 15–64**

Year	Casual Jobs (%)	Self - Employed (%)	Regular Jobs (%)	Unpaid Work (%)
1993-94	11.9	28.1	3	57
1999-2000	10.7	22.2	2.9	64.2
2004-05	11.4	22	3.6	62.9
2011-12	20.2	26.4	5.4	48
2017-18	11.6	21.7	8.9	57.7
2023-24	10.6	27.3	8.8	53.2

Note: Authors' calculation based on NSSO EUS and PLFS unit-level data. Population: employed females aged 15–64 years.

4.4 Educational Expansion and Its Employment Implications

Tables 4 and 5 together examine commensurate gains in labour market participation due to improvement in female educational attainment. The transformation journey in the educational profile of Rajasthan's female population between 1993-94 and 2023-24 is in table 4. The share of women in LFPR with only Primary-level education declined from 89.3% to 50.5%. While those with Secondary education increased from 9.0% to 37.1%, and the Graduate share rose from 1.7% to 12.4% during the same time period. These structural changes, reflects the cumulative effects of school enrolment efforts, the *Sarva Shiksha Abhiyan*, and initiatives to promote female education.

Table 5 reveals that these educational gains have not translated proportionately into enhanced labour market participation. Overall female LFPR across all educational groups in 2023-24 remains below the 1993-94 baseline only in the aggregate sense. Within educational categories, the persistent U-shape is notable.

**Table 4: Educational Distribution of Female Population
(%), Age Group 15–64**

Year	Primary Level (%)	Secondary Level (%)	Graduate Level (%)	Total (%)
1993-94	89.3	9	1.7	100
1999-2000	85.3	12.3	2.4	100
2004-05	82.6	14.8	2.6	100
2011-12	72.3	22.2	5.5	100
2017-18	64.7	27.4	7.9	100
2023-24	50.5	37.1	12.4	100

Note: Authors' calculation based on NSSO EUS and PLFS unit-level data.
Age group: 15- 64 years

**Table 5: Female LFPR (per 1,000) by Educational
Attainment, Age Group 15–64**

Year	LFPR – Primary (per 1000)	LFPR – Secondary (per 1000)	LFPR – Graduate (per 1000)	LFPR – Total (per 1000)
1993-94	643	184	403	410
1999-2000	589	185	288	354
2004-05	640	278	362	427
2011-12	538	198	342	359
2017-18	359	124	238	240
2023-24	703	324	497	508

Note: Authors' calculation based on NSSO EUS and PLFS unit-level data. Age group: 15–64 years

The structural diagnosis found earlier is reinforced by the pattern of participation. The labour market has expanded educational opportunities without a commensurate expansion of formal employment that meets the aspirations of secondary-educated women. This is reflected in the growing pool of educated women who are neither in the labour force nor in formal employment.

5. Logistic Regression Analysis: Determinants of Female LFPR

5.1 Pooled and Sector-Specific Results (2023-24)

The results of binary logistic regression models are estimated and presented for all workers in Table 6 and for female workers in Table 7. Odds Ratios are reported throughout and significance levels are indicated by asterisks. The models account for household size, household job count, MPCE group, educational attainment, age group, marital status, caste category, and residential sector.

Table 6: Logistic Regression Results — Determinants of Labour Force Participation, PLFS 2023-24 (All Workers)

Explanatory Variable	All (1)	Rural (2)	Urban (3)
Constant Term	4.977***	3.415***	3.702***
Household Size	0.667***	0.650***	0.665***
Household Job Count	3.237***	3.441***	3.417***
MPCE: Lowest 40% (vs Middle 40%)	1.079	1.139*	0.981
MPCE: Top 20% (vs Middle 40%)	0.899	0.871	0.871
Primary Level (vs Secondary Level)	2.051***	1.776***	1.741***
Graduate Level (vs Secondary Level)	3.504***	3.614***	3.693***
Age 30–44 (vs 15–29)	4.930***	7.356***	4.306***
Age 45+ (vs 15–29)	1.733***	2.447***	1.468***
Unmarried (vs Currently Married)	0.166***	0.109***	0.304***
Widow/Divorced (vs Currently Married)	0.905	0.763	1.225
OBC (vs SC/ST)	0.813***	0.802***	0.778**
General (vs SC/ST)	0.668***	0.652***	0.633***
Urban Sector (vs Rural)	0.564***	—	—
Gender Female	0.081***	0.153***	0.042***
Gender 3rd Gender	0	0	—
No. of Observations	13,383	7,971	5,412
Log Likelihood	-5179	-2703	-2239
Pseudo R-squared	0.398	0.422	0.398

Note: Odds ratios are reported. *** p<0.01, ** p<0.05, * p<0.1. Reference groups: Age 15-29, Currently Married, SC/ST, Rural Sector, Female, MPCE Middle 40%, Education: Secondary Level

The results in Table 6 largely follow expected patterns, though some warrant closer contextual reading. Household job count is the strongest positive predictor of labour force participation, with an Odds Ratio of 3.237 in the pooled model — each additional employed household member nearly triples the odds that a given individual is also employed. This likely reflects intra-household employment pressures and networks, complementary skill deployment within family enterprises, and shared knowledge of labour market opportunities. The rural model shows an even higher Odds Ratio of 3.441, consistent with the prevalence of family-based agricultural enterprises in rural areas. The gender coefficient is strikingly low at 0.081: women's odds of labour force participation are roughly twelve times lower than men's. This gap persists even after controlling for observed individual and household characteristics, pointing to unobserved social norms, safety concerns, and structural labour market barriers as underlying causes. Household size shows that individuals in larger households are less likely to participate in the labour force, net of other factors. This finding is consistent with the substitutability of household members in unpaid domestic and care work. In larger households, some members are released from the imperative of market employment through the informal provision of domestic labour by others.

Table 7 presents determinants of female labour force participation, and enables a more focused examination of the factors shaping women's employment decisions. The Household Job Count coefficient of 3.734, confirms the strong positive association between intra-household employment and female participation. The Urban Sector coefficient is 0.294, indicates that the odds of an urban woman being in the labour force are less than one-third of those of her rural counterpart. This rural-urban differential in female participation reflects both the concentration of informal agricultural employment in rural areas and the paucity of suitable formal employment for women in urban settings.

The education Odds Ratios in Table 7 confirm and quantify the U-shaped relationship between education and female LFPR. Relative to the reference category (Secondary level), illiterate/Primary-educated women have substantially higher odds of participation at 2.496 in the pooled model; 2.948 in the urban model, and Graduate-educated women have the highest odds of participation (OR = 3.843 pooled; 4.108 urban). The urban graduate Odds-Ratio of 4.108 is particularly striking and confirms that in urban areas, graduate qualifications provide a decisive advantage in accessing employment.

Table 7: Logistic Regression Results — Determinants of Female Labour Force Participation, PLFS 2023-24

Explanatory Variable	All (1)	Rural (2)	Urban (3)
Constant Term	0.438***	0.481***	0.120***
Household Size	0.607***	0.614***	0.578***
Household Job Count	3.734***	3.759***	4.119***
MPCE: Lowest 40% (vs Middle 40%)	1.113	1.183*	0.999
MPCE: Top 20% (vs Middle 40%)	0.91	0.84	0.939
Primary Level (vs Secondary Level)	2.496***	1.873***	2.948***
Graduate Level (vs Secondary Level)	3.843***	2.984***	4.108***
Age 30–44 (vs 15–29)	5.851***	8.157***	4.709***
Age 45+ (vs 15–29)	2.045***	2.831***	1.564**
Unmarried (vs Currently Married)	0.507***	0.213***	2.058***
Widow/Divorced (vs Currently Married)	1.169	0.874	1.700***
OBC (vs SC/ST)	0.796***	0.820**	0.709**
General (vs SC/ST)	0.575***	0.498***	0.585***
Urban Sector (vs Rural)	0.294***	—	—
No. of Observations	6,775	4,114	2,661
Log Likelihood	-2961	-1662	-1181
Pseudo R-squared	0.369	0.382	0.285

Note: Odds Ratios reported. *** p<0.01, ** p<0.05, * p<0.1. Reference groups: Age 15–29, Currently Married, SC/ST, Rural Sector, MPCE Middle 40%, Education: Secondary Level. N = 6,775 (All); 4,114 (Rural); 2,661 (Urban)

Age group effects are also prominent, women aged 30–44 have odds of participation nearly six times (OR = 5.851) those of women aged 15–29, and the rural coefficient (8.157) exceeds the urban one (4.709) substantially. This age-participation profile can be due to marriage and early childbearing employment in agrarian economies, which interrupts formal employment. These women re-enter into agricultural or family enterprise work once their children grow older and economic pressures intensify. Unmarried women exhibit lower odds of participation than married women in the pooled and rural models, reflecting the role of economic necessity in driving married women with families into the labour force. In urban areas, however, the pattern reverses, unmarried urban women have significantly higher odds of participation consistent with

the greater prevalence of formal sector employment among educated young women prior to marriage in urban contexts.

Caste effects remain significant and directionally consistent across all models: OBC women with OR equal to 0.796 and General category women with OR equal to 0.575 exhibit lower odds of participation than SC/ST women, this residual caste effect, net of all observable socio-economic characteristics, confirms that compulsion-driven participation remains a structural feature of employment among marginalised social groups. Social norms around acceptable female employment continue to differentiate participation by caste even within income-controlled analyses.

6. Discussion

The findings reported above covers empirical, structural, and normative aspects of women's employment in Rajasthan. At the empirical level, the most consequential finding is the recovery of female LFPR in Rajasthan between 2017-18 and 2023-24, with the historic nadir of the PLFS 2017-18 estimates. Two competing explanations need attention. The first is structural. The recovery reflects genuine re-entry of women into employment, driven by post-pandemic economic recovery, the expansion of self-help group-linked livelihoods under the National Rural Livelihoods Mission, and increasing demand for casual and home-based labour in both rural and urban areas. The second explanation requires methodological differences. The PLFS 2023-24 adopted a revised activity status classification and a modified household schedule that may have improved the capture of short-duration or subsidiary employment, among women in rural areas, who were previously undercounted in the 2017-18 PLFS round (Abraham, 2017; Deshpande & Singh, 2021). Both explanations are partially correct, and disaggregating their respective contributions requires time-series consistency that is currently unavailable.

The persistent and structural nature of the rural–urban divide in female LFPR is a second major finding. Even after exhaustive statistical control for individual and household characteristics, urban women in Rajasthan participate in the labour force at lower rates than their rural counterparts. This residual effect is attributable to a combination of

factors. First, the greater prevalence of unpaid agricultural labour as a default employment category in rural areas; second, the concentration of *pardah* norms and spatial mobility constraints in urban Rajasthan's middle-class households; third, the limited availability of suitable formal employment for women in secondary cities and small towns and fourth, the higher reservation wages associated with secondary education in urban settings. The urban unemployment rate among women exceeding that of men is commonly associated with labour market failure which underscores the severity of the mismatch between educated women's aspirations and available opportunities and skill sets.

The “education-employment paradox” documented above constitutes a structural challenge of the first order. Rajasthan has invested substantially in female education over the past three decades, and these investments are in terms of enrolment and attainment. Yet the labour market has not kept pace with this educational transformation. Secondary-educated women face a structural void in which they are neither willing nor able to take up the employment that is available. The result is a large and growing cohort of educated women outside the formal economy, a serious waste of human capital, with implications for both individual welfare and aggregate productivity.

The caste dimension adds further complexity to the female LFPR picture. SC/ST women participate at higher rates than General category women even after controlling for observable characteristics, which challenges any simple narrative equating higher participation with empowerment. The regression results instead suggest that SC/ST women face lower barriers to entering the workforce — reflecting less social stigma around visible female employment, greater household reliance on female earnings, and different occupational structures within predominantly SC/ST communities. Policies should therefore focus as much on improving the quality of SC/ST women's employment as on raising participation rates among General category women.

7. Policy Implications

The findings of this study can be used to suggest few policy recommendations. First, the expansion of child care infrastructure is an urgent priority. The regression results and the

employment structure data jointly confirm that household size is a significant negative predictor of female participation. Investment in subsidised community-managed crèches, Anganwadi centres and elderly care facilities would reduce the domestic care burden that limits women's participation in market employment, particularly in rural areas where such services are deficient.

Second, skill development programmes shall align with actual labour market demand. The education-employment paradox documented in this study reflects a failure of coordination between the educational system and the labour market. Secondary-educated women's qualifications do not match with available employment skill requirements. Focus shall shift to targeted vocational training programmes, linked to skill sets required by industries in sectors such as healthcare, education, Information Technology Enabled Services (ITES), agro-processing etc.

Third, the formalisation of informal and home-based work deserves sustained policy attention. As the vast majority of employed women in Rajasthan is in informal, or unpaid work, policies extending social security coverage, statutory minimum wages, and occupational health protections to home-based workers shall be implemented.

Fourth, targeted support for SC/ST women should address the quality dimension of their employment. Given that SC/ST women already participate at high rates, the priority for this demographic is improving wages by re-skilling and retraining them for the better paid jobs, improve their working conditions, and occupational mobility rather than increasing participation per se. Reservation policies in government employment, intervention in terms of targeted microcredit access, and community-level support for productive self-employment in non-agricultural activities are some of the policy suggestions.

Fifth, urban female unemployment demands urgent and specific policy attention. The 2023-24 data reveal urban female unemployment rates exceeding 11%, substantially higher than urban male rates. This suggests a supply-demand mismatch in urban Rajasthan's formal labour market that cannot be addressed by supply-side interventions alone. Demand-side measures — including gender-responsive industrial policy, targeted incentives for firms employing women in formal roles, and the expansion of urban public employment in services are necessary complements to education and skill development.

8. Conclusion

This paper has focused on a comprehensive and longitudinal analysis of female labour force participation in Rajasthan from 1993-94 to 2023-24. The analysis confirms a non-linear trend in female LFP, a period of relative stability through 2004-05, a secular decline to 2017-18, and a significant recovery in 2023-24. The recovery is encouraging but must be interpreted with caution.

The regression analysis confirms that household job count, age, and graduate education are the strongest positive predictors of female participation, whilst urban residence, unmarried status (in rural areas), and General caste category are associated with substantially lower odds. These findings are robust across multiple models and highlight the multi-dimensional nature of the constraints facing female employment in Rajasthan. The study's key theoretical contribution lies in its rigorous empirical documentation of the education-employment paradox and the compulsion-driven nature of SC/ST female employment, findings that complicate standard human capital and empowerment narratives and call for more nuanced policy responses.

Several limitations of the present study merit acknowledgement. The NSSO EUS and PLFS surveys are cross-sectional at each round, precluding the tracking of individual employment transitions over time. The absence of time-use data prevents a precise measurement of unpaid care and domestic work, which is central to understanding why women are outside the labour force. The surveys' unit of analysis is the household rather than the workplace, limiting the analysis of demand-side factors such as employer discrimination and occupational segregation. Finally, methodological discontinuities between the EUS and PLFS rounds introduce uncertainty into inter-round comparisons, particularly around the 2011-12 to 2017-18 transition.

Future research should address these limitations through longitudinal panel designs, qualitative methods capable of capturing social norm dynamics and intra-household bargaining, and explicit modelling of labour demand conditions including firm-level and sector-level data. Policy evaluations of specific interventions like Mahatma Gandhi National Rural Employment Guarantee Scheme— MGNREGS, *Beti Bachao Beti Padhao*, the National Rural Livelihoods Mission, and others, — using quasi-experimental

methods would also substantially advance the evidence base for targeted gender employment policy in Rajasthan and comparable states.

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