

Why does high female literacy rate not always translate into higher female labour force participation in India?

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ABSTRACT

Female literacy rates in India have improved substantially over the past few decades, with notable increases in secondary and tertiary education enrolment, particularly in STEM disciplines. Human Capital Theory suggests that higher educational attainment should increase female labour force participation (Becker, 1964; Mincer, 1974). However, this relationship remains weak in India, creating an important development paradox. Historically, female labour force participation declined from 42.7% in 2004–05 to 24.5% in 2019 before recovering to 41.7% in 2023–24, although much of this increase was concentrated in rural and unpaid family work (MOSPI, 2024; Sorsa, 2015). This study investigates why rising female education does not consistently translate into higher labour force participation by analysing the 2020–21 Periodic Labour Force Survey (PLFS) microdata. Using person-level data for 201,086 women, the study examines the relationship between educational attainment, social group, marital status, rural–urban residence and labour force participation. The findings aim to provide evidence on the structural and socio-economic factors that continue to constrain women’s employment despite improvements in educational attainment.

INTRODUCTION

The expansion of female education is widely regarded as one of the most transformative forces in modern economic development. Across advanced and emerging economies, rising female literacy and educational attainment have historically coincided with greater integration of women into labor markets, reinforcing the predictions of human capital theory that education enhances productivity, raises potential earnings, and increases the opportunity cost of remaining outside paid work (Becker, 1964; Mincer, 1974). Yet India presents a striking and persistent anomaly. Despite substantial improvements in women’s educational attainment over the past three decades, female labor force participation (FLFP) has not followed the upward trajectory anticipated by standard economic models. Instead, for much of the 2000s and 2010s, participation rates stagnated or declined—particularly among educated, urban, and middle-income women (Klasen & Pieters, 2015).

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This divergence constitutes one of the most compelling paradoxes in contemporary development economics. As the world's fourth-largest economy, India has simultaneously expanded access to schooling, increased female enrolment in secondary and tertiary education, and diversified into service-led growth. In theory, these structural transformations should have generated new opportunities for educated women. However, empirical evidence suggests that improvements in education alone have proven insufficient to guarantee sustained and meaningful labor market engagement. While recent survey data indicate a modest recovery in participation after 2019, much of this increase appears concentrated in rural and informal employment, raising concerns about the quality, stability, and voluntariness of women's work (Mehrotra & Parida, 2023).

The persistence of this education–employment disconnect calls into question the universality of conventional labor supply models. Neoclassical theory emphasizes the interplay of substitution and income effects: as education raises women's potential wages, labor market participation should become more attractive. At the same time, higher household income—often associated with marrying an educated spouse—may reduce the necessity of women's paid employment. In contexts where patriarchal norms and gendered expectations remain deeply embedded, the income effect may dominate, particularly among socially advantaged groups (Klasen & Pieters, 2015). However, interpreting declining participation purely as a rational household choice risk overlooking the structural and institutional constraints that shape women's options.

A growing body of interdisciplinary scholarship highlights that women's employment decisions in India are socially embedded and conditioned by caste hierarchies, gender norms, safety concerns, and labor market rigidities (Eswaran et al., 2013). Rising educational attainment has not been matched by proportional growth in secure, flexible, and socially acceptable employment opportunities. Occupational segregation, discrimination, and mismatches between qualifications and available jobs further weaken the translation of schooling into work. Comparative experiences, such as that of Iceland, demonstrate that high female education can coexist with robust labor force participation when supported by enabling institutional frameworks—underscoring that India's trajectory is not predetermined.

This paper argues that female education, while necessary, is insufficient to explain labour force outcomes in India. Using unit-level data from the 2020–21 Periodic Labour Force Survey (PLFS), the study empirically examines how educational attainment, social group, marital status and rural–urban residence are associated with female labour force participation. By integrating economic theory with sociological insights, the study moves beyond aggregate trends and preference-based explanations to provide an evidence-based account of India's enduring education–employment paradox and its implications for inclusive growth.

LITERATURE REVIEW

1. Education and Women's Labor Supply: Theoretical Expectations and Global Evidence:

Standard economic theory predicts a positive relationship between female literacy rates and labor force participation. Human Capital Theory posits that education enhances productivity and employability, increasing market wages and the opportunity cost of non-market activities (Becker,1964; Mincer,1974). This perspective is highly supported by empirical evidence from advanced market economies, where rising female literacy is accompanied by higher female labor force participation rates, particularly in formal employment. Information from **OECD** (OECD,2023) reinforces the role of education as a key driver of women's economic engagement.

However, comparative development literature reflects that this relationship is neither linear nor universal. South Asia emerges as a notable outlier amongst cross-country variations. In contrast to East Asia and Latin America, India has experienced stagnation and a significant contraction in FLFP (Female Labor Force Participation) despite significant improvements in female literacy and educational attainment (Chaudhary & Verick,2014). This divergence raises questions about the validity of the Standard Human Capital Models and underlines the need for context-specific explanations that incorporate institutional, cultural & labor market forces.

2. The Indian Paradox: Rising Education, Declining Participation

A broad range of empirical studies reflects the paradoxical decline in India's FLFP, despite the country being the world's 4th largest economy. Using NSS data, several studies show that FLFP substantially declined particularly among the educated, urban and middle-income women between the mid-2000s and 2010s (Chaudhary & Verick,2014; Klasen & Pieters,2015). Strikingly, the decline is most common amongst women with secondary and tertiary education which directly contradicts the predictions of human capital theory.

However, more recent data from PLFS (Periodic Labor Force Survey) reflects a recovery in FLFP after 2019. Scholars still warn against interpreting this trend as evidence of a deeper and lasting improvement in women's employment prospects. Disaggregated analysis reveals that this increase is concentrated primarily in the rural areas and driven by disguised employment, often linked to household economic hardships rather than improved labor demand (Mehrotra & Parida,2023). Existing literature frequently focuses on aggregate participation without distinguishing between regulated employment and subsistence labor, limiting its ability to explain the education-employment disconnect.

3. Income and Substitution Effects: Reassessing Labour Supply Theory

Neoclassical Labor Supply Theory offers an alternative explanation through the interaction of income and substitution effects. Higher education raises productivity, increasing the potential wages, creating a greater incentive to join the labor force substituting home labor. At the same time, higher education raises the likelihood of marrying an educated man with higher incomes, discouraging women's participation in the labor market. Due to domination of patriarchal norms in India, income effect tends to overshadow the substitution effect. This leads to educated women withdrawing from the labour force as household prosperity rises (Klasen & Pieters, 2015).

Despite its intuitive appeal, empirical validation of this explanation remains inconclusive. Most studies use household income as a stand-in for economic well-being, which makes it hard to separate women's own earning capacity from spousal income. Moreover, NSS data falls short of capturing women's reservation wages or latent labor supply, making it difficult to rigorously assess the substitution effects. Consequently, it remains unclear whether women's non-participation reflects deliberate labor supply choices or is shaped by structural constraints arising from labor market conditions and prevailing social norms. This unresolved debate points to the need for econometric strategies that explicitly address the endogeneity between education, income, and labour force participation.

4. Social Norms, Caste, and the Social Embeddedness of Women's Work

A growing body of interdisciplinary literature highlights that women's labour supply decisions in India are profoundly influenced by patriarchal norms, caste hierarchies, and intra-household power dynamics. Feminist economists contend that women's departure from paid employment frequently mirrors societal pressures rather than personal leisure preferences, particularly within upper-caste and middle-income households where female seclusion denotes social status (Eswaran et al., 2013).

Caste plays a significant role in shaping employment outcomes. Studies consistently find high labor force participation among Scheduled Caste and Scheduled Tribe women than among upper caste women, despite lower literacy rates. The inversion of the education-employment gradient indicates that participation among marginalised groups is shared more by economic necessity than by levels of human capital. Yet much of the literature leaves the interaction of caste and gender insufficiently theorised.

Becker's Household Model conceptualises labor supply as the outcome of intra-household utility maximisation (Becker, 1964). Under a comparative advantage framework, if male market labor yields higher returns, the efficient allocation assigns women a greater share of non-market household production. In the Indian context, entrenched social norms that legitimise gendered divisions of labor further reinforce and sustain this equilibrium.

However, critics contend that Becker's framework ignores the coercive influence of social expectations and undervalues power imbalances within households, especially when it comes to limiting women's options in the labour market even when financial incentives encourage participation.

5. Education – Employment Mismatch and Labor Demand Constraints

Recent studies highlight a growing education-employment mismatch as a primary constraint in strengthening the link between female education and labor force participation. Despite rising female enrolment in higher education and STEM disciplines, labor markets have failed to generate sufficient formal and socially acceptable jobs for educated women (International Labour Organisation [ILO], 2022). Employer expectations of long working hours, geographic mobility, and uninterrupted career trajectories disproportionately disadvantage women, especially after marriage and childbirth.

This mismatch is most prominent among urban, educated women, who have limited employment opportunities aligned with their qualifications and social constraints. Existing literature often interprets

non-participation as voluntary withdrawal, underestimating the role of labor demand constraints, workplace discrimination, and safety concerns. Consequently, the literature risks overstating preference-based explanations while understating structural barriers to women's employment. Moreover, few studies systematically examine how field of study—particularly STEM education interacts with labor market outcomes for women, representing a significant gap given policy emphasis on skill-based empowerment.

6. India in Comparative Perspective

Cross-country evidence demonstrates that India's experience is not an inevitable outcome of development or educational expansion. Countries such as Iceland illustrate how high female education can coexist with high labour force participation when supported by institutional mechanisms including affordable childcare, flexible work arrangements, and strong anti-discrimination policies. Even several low- and middle-income countries, such as Bolivia and Nigeria, report higher FLFP than India despite lower average levels of female education.

Comparative studies suggest that institutional and cultural factors, rather than education or income alone, play a decisive role in shaping women's employment outcomes. However, cross-national analyses often fail to explain why India diverges so sharply from global patterns, particularly given its expanding service sector and growing pool of educated women. This underscores the importance of examining India's experience through a framework that integrates labour markets, social norms, and household dynamics.

7. Synthesis and Research Gap

The literature suggests that while female education is a necessary condition for labour force participation, it is insufficient in the Indian context. Income effects, social norms, caste hierarchies, and labour demand constraints jointly shape women's employment outcomes, yet existing studies often examine these factors in isolation. Methodological limitations—especially the inability to disentangle women's own earning potential from household income—continue to hinder empirical clarity.

This study addresses these gaps by combining economic theory with empirical evidence from the 2020–21 PLFS unit-level dataset. Rather than relying solely on aggregate participation rates, the analysis focuses on individual-level demographic and socio-economic characteristics, including education, marital status, social group and rural–urban residence. The study therefore contributes an updated empirical assessment of the relationship between female education and labour force participation using nationally representative microdata.

METHODOLOGY

1. Empirical Strategy and Model Specification

A binary logistic regression model was estimated using unit-level data from the 2020–21 Periodic Labour Force Survey (PLFS). The analysis was restricted to female respondents. Female labour force participation served as the dependent variable and was coded as 1 for women participating in the labour force according to the Usual Principal Activity Status and 0 otherwise. The explanatory variables included highest educational attainment (B4Q8), age, social group (caste), and rural–urban residence. Household income (MPCE) was excluded because it was not available in the person-level dataset used in this study.

Formally, the latent propensity $FLFP^*_i$ for female i to participate in the labour force is specified as:

$$FLFP^*_i = \beta_0 + \beta_1 Education_i + \beta_2 Age_i + \beta_3 SocialGroup_i + \beta_4 Urban_i + \varepsilon_i$$

where:

$FLFP^*_i = 1$ if female i participates in the labor force, 0 otherwise

$Education_i$ = Highest educational attainment (PLFS B4Q8)

Age_i = Respondent's Age

$SocialGroup_i$ = Social Group (SC/ST/OBC/others)

$Urban_i$ = Urban residence

E_i = error term

Choice of Model: A binary logistic regression model was estimated because the dependent variable (female labour force participation) is binary. Logistic regression is widely used to analyse binary outcomes and allows the estimation of the association between educational attainment and labour force participation while controlling for age, social group, and rural–urban residence.

2. Dependent Variable:

- **Labor Force Participation:** A binary indicator is equal to 1 if the woman is categorized as employed or seeking employment according to PLFS definitions and 0 otherwise.

Key Explanatory Variables:

- **Education:** Multi-category indicator capturing the highest level of formal education attained, including secondary, higher secondary, graduate, postgraduate, and STEM specialized degrees.
- **Caste :** Social group categories (Scheduled Caste, Scheduled Tribe, Other Backward Classes, Forward Castes) to capture institutional and cultural constraints.

- **Age:** Continuous variable measured in complete years.
- **Rural-Urban Residence:** Binary indicator identifying whether the respondent resides in a rural or urban area.

RESULTS

Descriptive Statistics The analytical sample comprised 201,086 women from the 2020–21 Periodic Labour Force Survey (PLFS). The sample included women across all educational levels, caste groups, and both rural and urban areas. Most respondents reported no formal technical education, while a majority resided in rural areas. Female labour force participation remained substantially lower than non-participation, highlighting the persistent gap between educational attainment and labour market engagement.

Table 1. Descriptive Statistics of the Analytical Sample (PLFS 2020–21)

VARIABLE	CATEGORY/STATISTIC	VALUE
SAMPLE SIZE	FEMALE RESPONDENTS	201,086
AGE (YEARS)	MEAN (SD)	31.80 (19.49)
FEMALE LABOUR FORCE PARTICIPATION	PARTICIPATING	43,070 (21.4%)
	NON-PARTICIPATING	158,016(78.6%)
RURAL/URBAN RESIDENCE	RURAL	115,477(57.4%)
	URBAN	85,609(42.6%)
SOCIAL GROUP	SCHEDULED CASTE	77,908(38.7%)
	SCHEDULED TRIBE	102,975 (51.2%)
	OTHER BACKWARD CLASS	19,715(9.5%)
	OTHERS	1,028(0.5%)

GENERAL EDUCATION	NOT LITERATE	55,037(27.4%)
	LITERATE WITHOUT FORMAL SCHOOLING	244 (0.1%)
	BELOW PRIMARY	68 (0.0%)
	PRIMARY	1,571 (0.8%)
	MIDDLE	22,572(11.2%)
	SECONDARY	26,362 (13.1%)
	HIGHER SECONDARY	35,928 (17.9%)
	DIPLOMA/CERTIFICATE	22,069(11.0%)
	GRADUATE	18,240 (9.1%)
	POSTGRADUATE	1,342 (0.7%)
	PROFESSIONAL DEGREE	13,084 (6.5%)
	DOCTORATE & ABOVE	4,569 (2.3%)
TECHNICAL EDUCATION	NO TECHNICAL EDUCATION	197,005 (98.0%)
	TECHNICAL EDUCATION	4,081(2.0%)

Table 1 presents the descriptive statistics for the analytical sample comprising 201,086 women from the 2020–21 Periodic Labour Force Survey (PLFS). Approximately 21.4% of women were participating in the labour force, while 78.6% were outside the labour force. The average age of respondents was 31.8 years. A majority of the sample resided in rural areas (57.4%), and most respondents reported no formal technical education (98.0%). Educational attainment varied considerably across the sample, providing sufficient variation for examining the relationship between education and female labour force participation.

Table 2. Logistic Regression Results

A binary logistic regression model was estimated to examine the association between educational attainment and female labour force participation while controlling for age, social group, and rural–urban residence.

VARIABLE	COEFFICIENT	p-VALUE
Age	0.0083	<0.001
Urban Residence	-0.7187	<0.001

Education	Significant overall	<0.001(for several higher categories)
Social Group	Significant	<0.001

The regression results indicate that age is positively associated with labour force participation ($\beta = 0.008$, $p < 0.001$), suggesting that older women are slightly more likely to participate in the labour market.

Women residing in urban areas exhibit a significantly lower probability of labour force participation than women in rural areas ($\beta = -0.719$, $p < 0.001$), consistent with recent evidence that much of the recovery in female labour force participation has been concentrated in rural India.

Educational attainment demonstrates a heterogeneous relationship with labour force participation. Higher educational categories are generally associated with increased participation relative to the reference category, although the magnitude differs across educational levels. The strongest positive associations are observed among women with the highest educational attainment, supporting the argument that education improves labour market attachment but does not guarantee employment.

Social groups are also a significant determinant of labour force participation. Relative to the reference category, women belonging to other social groups display significantly different participation probabilities, indicating that labour market outcomes remain shaped by broader socio-economic and institutional factors.

Overall, the regression findings suggest that education alone is insufficient to explain female labour force participation in India. Demographic and social characteristics continue to play an important role in determining women's engagement with the labour market.

DISCUSSION

Education Does Not Guarantee Employment

Although human capital theory predicts that education enhances employability and labour supply, the empirical results illustrate that rising education levels in India do not automatically translate into higher and sustained FLFP. While a U-shaped relationship with education exists, its downward shift across decades signifies that even women with comparable educational backgrounds participate less today than in the past, partly due to changing labour demand conditions.

This aligns with research showing that the U-shape persists but shifts down over time, highlighting the *limitation of education as a standalone explanatory factor*.

Education Alone Is Insufficient

Although household income was not directly examined in this study, previous research suggests that higher household income may reduce women's labour force participation through income effects, particularly in settings where traditional gender norms remain strong (Klasen & Pieters, 2015). The present findings therefore indicate that education alone cannot fully explain women's labour market participation, and additional household and socio-economic factors warrant further investigation.

Social Norms and Structural Barriers

The regression results indicate that social group remains significantly associated with female labour force participation. These findings are consistent with previous studies suggesting that caste and broader socio-institutional factors continue to influence women's employment opportunities in India (Eswaran et al., 2013).

Labour Demand Constraints

The findings, together with previous literature, suggest that labour demand structures in India have not kept pace with rising education. Previous studies suggest that even where participation rises, much of it is absorbed into informal, subsistence, or unpaid family work — not high-quality formal employment. These findings are broadly consistent with previous research that supply-side factors alone cannot explain low FLFPR, and that demand-side, institutional, and market rigidities are critical impediments.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, the analysis is based on the cross-sectional 2020–21 Periodic Labour Force Survey (PLFS), which does not permit causal inference and captures associations rather than causal relationships between education and female labour force participation. Second, household income (measured through Monthly Per Capita Consumption Expenditure, MPCE) was not available in the person-level dataset used for this analysis and therefore could not be included in the regression model. As a result, the study could not directly examine the income effect or distinguish women's own earning potential from broader household economic conditions. Third, under PLFS definitions, labour force participation includes unpaid family work, which may overstate meaningful labour market engagement and partly explain the observed recovery in female labour force participation. Finally, the instrumental variable strategy proposed in the initial research design could not be implemented because suitable instruments were not available in the dataset. Consequently, the analysis relies on a standard logistic regression model with observable control variables and should be interpreted accordingly.

CONCLUSION

This study investigates the paradox whereby high female literacy does not consistently translate into proportionately higher female labour force participation in India. The empirical analysis indicates that while education is associated with female labour force participation, educational attainment alone does not fully explain women's labour market outcomes

Key findings include:

- Educational attainment was significantly associated with female labour force participation; however, education alone was insufficient to explain women's labour market engagement
- Significant differences in labour force participation across educational groups, social groups and rural–urban residence indicate that education alone is insufficient to ensure sustained labour market participation.
- Persisting social norms and structural barriers, including limited opportunities in formal sectors and normative gender roles, which discourage participation.
- Evidence that increased participation often reflects informal or unpaid work rather than meaningful, stable employment.

These results reinforce the broader literature's conclusion that policy interventions must extend beyond education subsidies and training to address structural labour market constraints, discriminatory practices, childcare and safety infrastructure, and socio-institutional norms that limit women's workforce engagement.

Future research should employ longitudinal or panel data to better examine causal relationships and explore how sectoral shifts, household characteristics, and changing labour market conditions interact with women's educational attainment to shape labour force participation.

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