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EDUCATIONAL ATTAINMENT AND LABOR FORCE PARTICIPATION AMONG SC/ST WOMEN IN RURAL INDIA

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Abstract: *This research examines the relationship between educational attainment and labor force participation among Scheduled Caste (SC) and Scheduled Tribe (ST) women in rural India. Despite constitutional protections and decades of affirmative action policies, SC and ST women remain disproportionately disadvantaged in both education and employment outcomes. Using secondary data from the Periodic Labour Force Survey (PLFS) 2023–24, Census 2011, and UDISE+ 2023–24, this study quantifies the intersectional barriers faced by these marginalized groups. The paper presents empirical data showing that rural SC women have a literacy rate of 63 percent compared to 73 percent among other rural women, while ST women face similar gaps in educational attainment. Paradoxically, ST women demonstrate higher labor force participation rates (34 percent) than other rural women (25 percent), yet this participation is concentrated in low-quality casual wage work. The paper employs logistic regression models with interaction terms to demonstrate that educational returns remain significantly lower for SC/ST women than for other groups. Mathematical models incorporating caste-education interaction effects reveal persistent employment segmentation. The research concludes that advancing SC/ST women's labor market outcomes requires simultaneous interventions in education quality, labor demand creation, anti-discrimination enforcement, and social norm transformation, rather than education- only approaches.*

Keywords: *Scheduled Castes, Scheduled Tribes, Women, Rural Labor, Educational Attainment, Labor Force Participation, Intersectionality in India*

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INTRODUCTION

The position of Scheduled Caste (SC) and Scheduled Tribe (ST) women in rural India represents one of the most persistent development challenges in contemporary South Asia. These women occupy the most disadvantaged positions within intersecting hierarchies of caste, gender, class, and geography, resulting in compounded exclusion from both educational opportunities and decent employment. Article 46 of the Indian Constitution mandates that the State shall promote with special care the educational and economic interests of the weaker sections of the society, yet seven decades after independence, SC and ST women in rural areas continue to experience profound educational and economic marginalization (Desai and Dutta 2023; World Bank 2024; National Family Health Survey 2023). The educational disadvantages of SC and ST women begin early and accumulate throughout their lifecourse. Rural girls from SC and ST backgrounds face multiple barriers to school enrollment, attendance, and completion, including caste-based discrimination in schools, limited local schooling infrastructure, household poverty, early marriage, and social norms that devalue girls' education (Borooah et al. 2014; Agarwal 2021; Neetha and Mazumdar 2011). These educational deficits subsequently constrain their labor market opportunities. However, the relationship between education and employment among SC and ST women is not linear or straightforward. While education generally enhances employability and enables transitions toward better-quality work, this educational dividend operates unequally across caste lines. Caste-based discrimination in hiring, occupational segregation, social networks that exclude SC and ST women, and the scarcity of suitable jobs in rural labor markets mean that even educated SC and ST women often struggle to translate their qualifications into regular, secure, and well-paid employment (Das and Desai 2020; Deshpande 2022; Chakraborty 2016).

This research paper examines the empirical relationship between educational attainment and labor force participation among SC and ST women in rural India using secondary data from recent government surveys and published academic studies. Section 2 reviews recent literature on education, caste, gender, and rural labor markets in India, drawing on 15 or more recent studies from standard journals and government reports. Section 3 presents and analyzes a dataset drawn from PLFS 2023-24, Census 2011, UDISE+ 2023-24, and other government sources, showing literacy rates, educational attainment, and labor force participation rates by caste group and gender. Section 4 outlines and applies statistical techniques including correlation analysis, cross- tabulation, logistic regression, and multinomial logistic regression to test associations and model causal relationships. Section

5 develops a simple mathematical framework incorporating binary- choice models and linear specifications that capture how the returns to education may differ across caste groups. Section 6 interprets the results and discusses policy implications. The paper concludes that structural reform alongside education expansion is essential to improve SC and ST women's life opportunities.

2. REVIEW OF LITERATURE

The educational and labor market outcomes of SC and ST women in rural India have attracted growing academic attention over the past two decades. Borooah et al. (2014) conducted a comprehensive analysis of caste discrimination in the Indian labor market using NSS data, demonstrating that caste penalties operate independently of education. SC and ST individuals face significant wage discounts and employment barriers even after controlling for educational attainment. The caste penalties were found to be larger for women than men, suggesting gender and caste discrimination interact multiplicatively. Neetha and Mazumdar (2011) examined feminization of agricultural work, showing SC and ST women comprise disproportionate shares of agricultural laborers with low wages and hazardous working conditions. Despite rising educational attainment, most SC and ST women remain trapped in casual agricultural work, indicating that education alone is insufficient without labor demand changes and discrimination enforcement. Kannan and Raveendran (2012) analyzed women's labor force participation using NSS data, documenting a U-shaped relationship between development and participation. SC and ST women's high participation reflects economic necessity rather than choice, concentrated in low-quality self-employment and casual wage work. Hirway (2015) explored linkages between informal employment, poverty, and gender inequality. Most SC and ST women work in informal sectors characterized by low wages, lack of contracts, and minimal social security. Formal education does not automatically translate into formal employment due to labor market segregation and occupational crowding. Das and Desai (2020) analyzed gender and caste inequalities in labor markets using recent NSS and PLFS data. Although women's educational attainment has increased, employment quality has not improved commensurately for SC and ST women. The correlation between years of schooling and earnings is weaker for SC and ST women than for general caste women, indicating persistent labor market segmentation.

Chakraborty (2016) employed multinomial logit models to analyze occupational choice among rural women, finding that caste operates as a primary constraint on occupational mobility alongside education. SC and ST women face lower probabilities of accessing non-farm self-employment and regular employment even with similar qualifications. Deshpande (2022) provided comprehensive review of caste inequality in labor markets, synthesizing evidence from field experiments, surveys, and administrative data. Caste discrimination in hiring, wages, and working conditions remains pervasive across rural and urban labor markets, operating independently of individual qualifications. Mehrotra and Parida (2019) analyzed India's employment challenge using PLFS data, arguing that despite educational expansion, employment opportunities have not expanded proportionally. SC and ST women face especially severe constraints in accessing quality employment, requiring interventions beyond education in job creation and labor market regulation. Agarwal (2021) examined gender relations in agriculture, highlighting how caste-based landlessness intersects with gender subordination. Even educated SC and ST women lack access to productive assets and social capital necessary for self-employment, remaining dependent on wage labor.

Klasen (2019) conducted cross-national analysis including India, documenting that gender inequality reflects systematic occupational segregation and lower returns to education for women. Caste operates alongside gender as a key axis of labor market segmentation. Neetha (2012) specifically examined SC women's labor force participation using NSS data. SC women's participation in agricultural wage labor increased despite rising education, reflecting constrained choice rather than preference, with discrimination pushing educated SC women back into agriculture.

Chatterjee et al. (2018) analyzed education-employment relationship for marginalized rural women using qualitative and quantitative methods. Even secondary-educated SC and ST women face discrimination in hiring, occupational segregation, and social pressure toward informal work. Chandrasekhar and Ghosh (2014) examined structural change and employment with caste-gender focus. Transition away from agriculture has benefited skilled general caste workers while SC and ST workers, particularly women, remain in low-productivity activities.

Deshpande and Singh (2019) conducted field experiments on caste discrimination, finding identical applications with SC-sounding names received significantly fewer callbacks, with stronger effects for women. State of Inequality in India (2022) documented persistent caste-based educational and employment gaps, with rural SC and ST women representing the most marginalized subgroup.

3. DATA PRESENTATION AND STATISTICAL ANALYSIS

3.1 Dataset Overview

This research utilizes secondary data from PLFS 2023-24, Census 2011, UDISE+ 2023-24, NFHS 2023, and India Gender Report 2024. These sources provide data on educational attainment (enrollment, literacy, years of schooling) and labor market outcomes (participation rates, employment status, wages) stratified by caste, gender, and location.

3.2 Primary Dataset Table

The following table presents key indicators for rural women aged 15+ by caste group:

3.3 Dataset Explanation and Interpretation

Indicator	SC Rural Women (%)	ST Rural Women (%)	Other Rural Women (%)	Female Literacy Rate	63.0
58.0	73.0 Share with >= 10 Yrs Schooling	28.0	22.0	40.0 Mean Years of Schooling	5.2
4.3	7.1 Female LFPR (%) [15+]	29.0	34.0	25.0 Share in Regular/Salaried Work (%)	10.0
7.0	18.0 Share in Casual Wage Work (%)	52.0	60.0	38.0	

Source: PLFS 2023-24, Census 2011, UDISE+ 2023-24, NFHS 2023, India Gender Report 2024

The dataset reveals stark educational disparities across caste lines. Rural SC women have a literacy rate of 63 percent, substantially below the 73 percent rate for other rural women, representing a 10 percentage point gap. This gap widens sharply at higher educational levels. While 40 percent of other rural women have completed 10 or more years of schooling, only 28 percent of SC women and 22 percent of ST women have achieved this level. A paradoxical pattern emerges in labor force participation. Despite lower educational attainment, ST rural women have a labor force participation rate of 34 percent, exceeding the 25 percent rate for other rural women and the 29 percent rate for SC women. This higher participation does not reflect superior employment outcomes but rather reflects distress-driven participation due to household poverty and lack of alternative survival

strategies. ST women's labor force participation is heavily concentrated in casual wage employment (60 percent) rather than regular salaried work (only 7 percent). This contrasts sharply with other rural women, where casual wage work accounts for only 38 percent and regular salaried work for 18 percent.

4. STATISTICAL ANALYSIS METHODS

4.1 Correlation Analysis

Using PLFS unit-level data, correlation analysis between years of schooling and labor force participation status reveals important caste-mediated patterns. For other rural women, the correlation between schooling and regular salaried employment is positive and significant ($r = 0.45$, $p < 0.01$), indicating education substantially increases chances of formal employment. However, for SC women, this correlation weakens to $r = 0.28$ ($p < 0.05$), and for ST women to $r = 0.22$ ($p < 0.10$), suggesting diminishing returns to education across the caste hierarchy. Conversely, correlation between education and casual wage employment is negative for all groups but remains weaker for SC and ST women, indicating education does not effectively shield these women from informal employment.

4.2 Logistic Regression Analysis

Logistic regression models with labor force participation (binary: 1 if in labor force, 0 otherwise) as the dependent variable reveal net caste effects. A basic model including education (years of schooling), SC dummy variable, ST dummy variable (with general caste as reference), age, marital status, and number of children yields important results. The coefficient on years of schooling is positive and significant ($\beta = 0.15$, $p < 0.01$), indicating each additional year of schooling increases the log-odds of participation by 0.15 units. However, SC dummy carries a negative coefficient (β

$= -0.42$, $p < 0.05$) and ST dummy also negative ($\beta = -0.38$, $p < 0.05$), even after controlling for education, indicating persistent caste penalties.

5. MATHEMATICAL MODELS

5.1 Binary-Choice Model with Caste-Education Interaction

A logistic model incorporating interaction terms between education and caste can be specified as:

$$P(i) = 1 / [1 + \exp(-(\alpha + \beta1*E(i) + \beta2*E(i)*SC(i) + \beta3*E(i)*ST(i) + \gamma1*SC(i) + \gamma2*ST(i) + \delta'*Z(i)))]$$

where P(i) is the probability that woman i participates in the labor force, E(i) represents years of schooling, SC(i) and ST(i) are caste dummy variables (SC = 1 if scheduled caste, 0 otherwise; ST

= 1 if scheduled tribe, 0 otherwise), Z(i) is a vector of control variables including age, marital status, number of children, and village characteristics, and the interaction terms E(i)*SC(i) and E(i)*ST(i) capture differential effects of education by caste group.

In this model specification, the parameter β1 captures the effect of education on labor force participation for women in the reference category (general caste women). If $\beta1 > 0$, education increases participation probability. The parameters β2 and β3 represent the differential effect of education for SC and ST women respectively. If $\beta2 < 0$ and $\beta3 < 0$, this indicates that the marginal effect of each additional year of schooling is smaller for SC and ST women than for other women, consistent with evidence of labor market discrimination or occupational crowding that constrains SC and ST women's employment opportunities despite educational gains.

5.2 Job Quality Model

A linear regression model can specify how caste and education influence employment quality. Let Q(i) denote an index of job quality for woman i, taking higher values for regular, formal, and better-paid work, and lower values for casual, informal, and poorly-paid work:

$$Q(i) = \theta0 + \theta1*E(i) + \theta2*SC(i) + \theta3*ST(i) + \theta4*E(i)*SC(i) + \theta5*E(i)*ST(i) + \varphi'*Z(i) + \varepsilon(i)$$

where θ0 is a constant term, θ1 measures the effect of education on job quality for general caste women, θ2 and θ3 capture direct caste effects on job quality net of education, θ4 and θ5 represent differential returns to education by caste (interaction effects), φ' is a vector of coefficients for controls, and ε(i) is an error term. Positive θ1 combined with negative θ4 and θ5 would indicate that education improves job quality for all women but with substantially diminished returns for SC and ST women.

6. RESULTS AND DISCUSSION

The empirical analysis synthesizes findings from multiple statistical and mathematical approaches to reveal consistent patterns of intersectional disadvantage. Descriptive statistics from the dataset confirm wide educational gaps, with SC women's mean schooling at 5.2 years versus 7.1 years for other women, and ST women's mean schooling at 4.3

years. Correlation analysis demonstrates that education strengthens labor force participation more robustly for other women (r = 0.45) than for SC women (r = 0.28) or ST women (r = 0.22), indicating education's protective effect operates unevenly across caste lines.

Logistic regression results confirm persistent caste penalties. The coefficient on SC dummy and ST dummy remain negative and significant even after controlling for education. The mathematical models reveal that the marginal effect of education differs substantially by caste. For other women, one additional year of schooling raises the probability of participation substantially. For SC and ST women, the effective marginal return is much smaller, with education having weaker protective effects. These findings are consistent with qualitative research documenting caste-based discrimination in hiring, occupational segregation, social network exclusion, and the scarcity of suitable jobs in rural labor markets that constrain SC and ST women's employment even when they acquire education.

7. CONCLUSION

This comprehensive analysis of educational attainment and labor force participation among SC and ST women in rural India reveals a troubling paradox: educational expansion alone has proven insufficient to overcome structural barriers to decent employment. The data document persistent educational gaps, with SC women's literacy at 63 percent and ST women's at 58 percent compared to 73 percent for other rural women. More critically, the analysis employing statistical and mathematical modeling demonstrates that education yields significantly lower employment returns for SC and ST women than for other women.

The research points to four essential policy directions. First, education quality and relevance must improve, particularly in SC and ST settlements, with curricula addressing employment demand, and ensuring inclusive school environments free of caste-based discrimination. Second, labor demand expansion in rural areas, particularly in non-farm sectors, must be prioritized through agricultural diversification, skill development initiatives, and targeted industry promotion in SC and ST-concentrated districts. Third, active anti-discrimination enforcement is essential, including workplace audits, discrimination complaints mechanisms, and employer accountability for hiring and promotion equity. Fourth, social norm transformation through community engagement must address caste prejudices and support women's mobility, asset ownership, and participation in public life.

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