

Gender Inequality in Human Capital Formation, Accumulation and Labour Market Outcome

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Background

Persistent gender disparities in human capital formation and labour market outcomes remain a central barrier to equitable economic growth in developing economies and impose economic costs by constraining women's productive participation in the labour market.. Within the framework of human capital theory (Becker, 1964; Mincer, 1974), investment in education and training enhances productivity and earnings potential; however, social and institutional constraints systematically restrict women's access to these investments. In India, gender norms continue to influence educational attainment, skill development, and employment participation, reinforcing structural inequalities in the accumulation and utilization of human capital.

The study is grounded in the theories of *equality of opportunity* (Rawls, 1971) and *capability approach* (Sen, 2006), which posit that just and inclusive development requires dismantling barriers that constrain individual capabilities. Gender disparities in education, training, and employment are interpreted as systemic constraints that lower aggregate productivity and generate opportunity costs for the economy. The labour market implications of gendered disparities in human capital are also informed by Engels' (1884) structural view of economic inequality and the feminist economic perspective that links women's economic marginalization to systemic undervaluation of their work (Kabeer, 2011; Duflo, 2012). These inequalities represent not only a social injustice but also a macroeconomic inefficiency—manifesting as lost output, foregone wages, and reduced returns on human capital investments. Thus, the present analysis investigates the intersection of gender, education, skill formation, and labour force participation to uncover how inequality in human capital accumulation translates into unequal labour market outcomes.

Method

The analysis uses nationally representative data from the Periodic Labour Force Survey (PLFS) 2022–23, conducted by the National Statistical Office (NSO), Ministry of Statistics and Programme Implementation (MoSPI). The working-age population (15–59 years) forms the analytical sample (N = 2,91,651), with gender-disaggregated estimates. Descriptive and econometric methods were employed to document patterns and determinants of inequality.

Variables

- Human Capital Formation: Captured using educational attainment (six categories from illiterate to postgraduate), technical education (binary), and vocational training (binary).
- Labour Market Outcome: Measured by Labour Force Participation Rate (LFPR) and type of employment (formal vs. informal).
- Key Covariates: Caste, Place of Residence, and interaction terms between gender and education.

Analytical Strategy

The analysis uses descriptive statistics and logistic regression to estimate the probability of formal employment as a function of education, gender, and vocational training:

1. Descriptive Analysis: Gender disparities in education, skill acquisition, and labour force participation were computed.
2. Econometric Analysis: Logistic regression estimated the probability of formal employment as a function of education, gender, vocational training, and their interactions:

$$\begin{aligned} \text{Logit}(P(\text{Formal Employment})) \\ &= \beta_0 + \beta_1(\text{Education}) + \beta_2(\text{Gender}) + \beta_3(\text{Vocational Training}) \\ &+ \beta_4(\text{Education} \times \text{Gender}) + \epsilon \end{aligned}$$

Significance levels were tested at $p < 0.05$ and $p < 0.01$. The model accounts for interaction effects to examine whether the impact of education on formal employment differs by gender, revealing the compounded disadvantages women face despite comparable qualifications.

Findings

Preliminary results highlight persistent gender gaps in both human capital accumulation and labour market participation. Females constitute nearly half of the working-age population but remain severely underrepresented in higher education and technical training. The share of illiterate or below-primary females (25.3%) is almost double that of males (13.0%), while male participation exceeds female participation in diploma (18.0% vs. 13.5%) and graduate (12.3% vs. 9.4%) categories. Similarly, only 2.96% of females report having technical education compared to 5.22% of males.

In terms of labour outcomes, the female LFPR (40.1%) is roughly half of the male LFPR (80.8%), implying substantial underutilization of women's human capital. Regression estimates confirm that education is a strong predictor of formal employment: individuals with postgraduate education are over four times more likely to secure formal jobs than those with no education. However, being female significantly reduces the odds of formal employment, even after controlling for education and training.

Interaction effects show that the positive impact of higher education on employment is weaker for women, suggesting structural constraints beyond human capital differences. Vocational training improves employment prospects for both sexes, but women's limited access curtails potential gains. The absence of training reduces the probability of formal employment by approximately 20%.

Table 1. Gender Gap in Educational Attainment and Skill Development (PLFS 2022–23)

Indicator	Male (%)	Female (%)	Gap (percentage points)
Illiterate & Below Primary	13.03	25.28	12.25

Diploma/Certificate	18.04	13.49	4.55
Graduate	12.29	9.36	2.93
Technical Education	5.22	2.96	2.26
Received Vocational Training	37.68	20.17	17.51

Source: Author's calculation using PLFS 2022–23 (N = 2,91,651)

Table 2. Labour Force Participation Rate (LFPR) by Gender

Gender	LFPR (%)	Difference (percentage points)
Male	80.76	—
Female	40.07	40.69
Total	60.56	—

Source: PLFS 2022–23

Table 3. Logistic Regression: Determinants of Formal Employment

Type of Employment	Coefficient
Education Level	
Illiterate & below primary ®	
Primary to middle	1.017***
Higher secondary	1.746***
Diploma/certificate course	2.484***
Graduate	3.644***
Postgraduate and above	4.265***
Gender	
Male®	
female	-0.248***
Vocational Training	
Yes®	
No	-0.206***
Interaction Terms(education*Gender)	
Educationlevel(male)®	

Primary to middle(female)	-
	0.418***
Higher secondary(female)	0.036***
Diploma/certificate course(female)	-0.108***
Graduate(female)	0.432***
Postgraduate and above(female)	0.36***

Significance: * p<.01, ** p<.05, * p<.1**

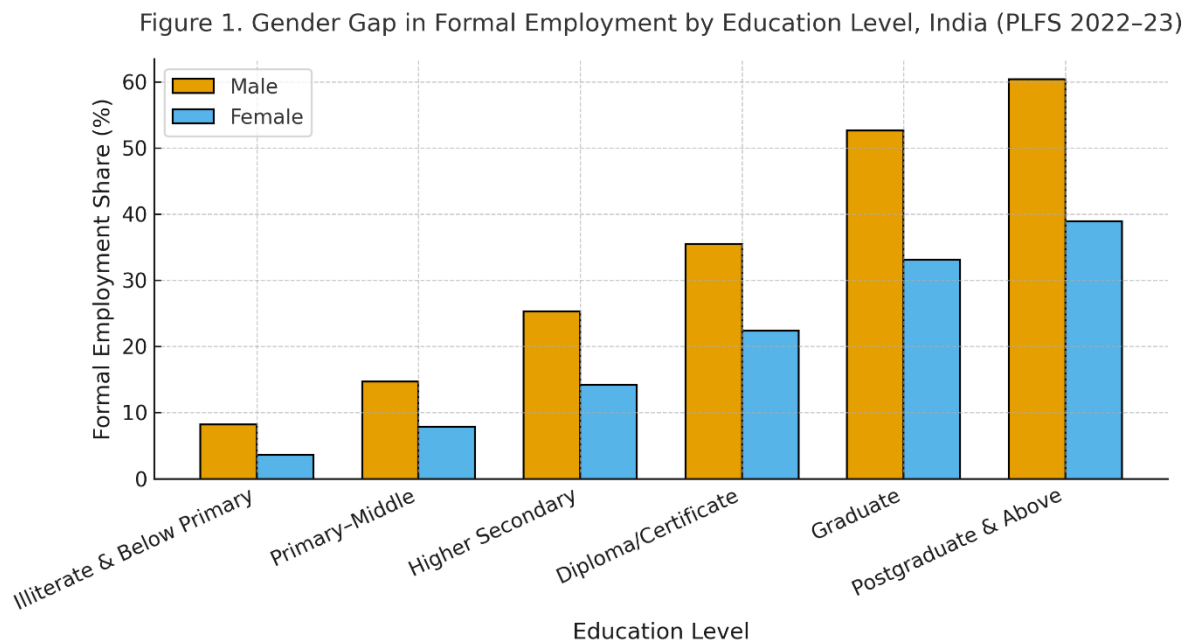


Figure 1. Gender Gap in Formal Employment by Education Level, India (PLFS 2022–23)
Source: Author’s calculation using PLFS 2022–23.

Economic and Policy Implications

The evidence demonstrates that gender inequality in human capital formation and labour outcomes carries quantifiable economic costs. With female LFPR (40.07%) at half that of men(80%), India utilizes only about three-quarters of its potential human capital base. Even partial convergence—such as raising female participation by 10 percentage points—could increase aggregate labour output by 8–10% demonstrating the substantial opportunity cost of gender inequality.

At the individual level, the 24.8% gender penalty in formal employment translates into foregone wages and lower returns on education. At the macro level, the cumulative effect of such disparities amounts to a loss equivalent to 15–20% of potential GDP, aligning with McKinsey Global Institute’s (2015) projection that gender parity in labour participation could add \$700 billion (≈18% of GDP) to India’s economy by 2025.

To address these inefficiencies, policy measures must expand women’s access to tertiary and

technical education, integrate vocational and digital skill training into women's pathways, reduce care-related constraints, and implement gender-sensitive labour market reforms to mitigate occupational segregation.

Conclusion

The findings underscore the structural inefficiencies generated by gender inequality in human capital formation. The unequal distribution of education and skill development translates into an **economic opportunity cost**. Women's unequal access to education, skills, and formal employment translates into lost productivity, foregone income, and a narrower developmental horizon for the entire economy. Despite India's demographic advantage, its labour market continues to function below potential due to the systematic underutilization of women's human capital.

Bridging these disparities is therefore an investment in both justice and growth. As Amartya Sen (1999) reminds us, *“Development is freedom — and the denial of freedom, whether through poverty or social constraints, limits not only human lives but also the prosperity of nations.”* Ensuring women's equal participation in education and employment expands these freedoms, unlocking the productive capacity that drives inclusive and sustainable growth.

Ultimately, advancing gender equality in human capital formation is not merely a social imperative — it is an economic necessity. Empowering women through education and labour market inclusion represents the single most transformative lever for achieving India's long-term developmental goals and realizing its demographic dividend in full.