

Female Labour Force Participation and Economic Development in India: A State-Level Panel Analysis, 2017–18 to 2021–22

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Abstract

This paper examines the relationship between female labour force participation and economic development across 28 Indian states over five PLFS survey years, from 2017–18 to 2021–22. Female labour force participation rate (FLFPR) is measured for women aged 15 years and above under the usual-status (principal status plus subsidiary status) approach. Economic development is proxied by real per-capita Net State Domestic Product (NSDP) at constant 2011–12 prices. The study first estimates pooled ordinary least squares, then controls for unobserved time-invariant state characteristics using state fixed effects, and finally adds year fixed effects. The pooled specification shows a positive association between FLFPR and log real per-capita NSDP. However, after controlling simultaneously for state and year effects, the FLFPR coefficient falls substantially and is statistically insignificant. A first-difference robustness check likewise finds no statistically significant relationship. The results indicate that cross-state differences in female participation and economic development cannot be interpreted as a simple causal relationship. The findings highlight the importance of employment structure, sectoral composition, household constraints and state-specific characteristics.

Keywords: Female labour force participation; economic development; India; panel data; fixed effects; labour economics; PLFS.

1. Introduction

Women's participation in paid and economically productive activity is central to discussions of labour supply, human capital utilisation and inclusive development. India has historically recorded a large gender gap in labour force participation, although female participation has increased substantially since the introduction of the Periodic Labour Force Survey (PLFS). According to official PLFS data, female LFPR for persons aged 15 years and above under usual status increased nationally from 23.3% in 2017–18 to 37.0% in 2022–23.

The relationship between women's participation and economic development is theoretically ambiguous. Rising income may increase employment opportunities and wages for women, encouraging participation. At the same time, higher household income may reduce the necessity for women to undertake market work. Structural transformation can also change the availability of jobs, and the effect may depend on whether growth occurs in sectors that employ women.

This paper asks: Is female labour force participation associated with economic development across Indian states once persistent state differences and common year shocks are taken into account? Rather than

treating correlation as causation, the paper estimates a state-level panel relationship and explicitly discusses the limitations of causal interpretation.

2. Research Objectives

- To document changes in female labour force participation across Indian states between 2017–18 and 2021–22.
- To examine the association between female LFPR and real per-capita NSDP.
- To estimate whether the relationship survives controls for state-specific and year-specific effects.
- To identify economic explanations for why female participation may not move one-for-one with measured state income.

3. Literature Review

International literature has often discussed a possible U-shaped relationship between female labour force participation and economic development. The underlying argument is that women may participate heavily in low-income agrarian economies, withdraw from market work during certain stages of industrialisation and rising household income, and then re-enter as education, service-sector employment, wages and institutions improve.

Indian evidence is more nuanced. Klasen and Pieters (2015) found that rising household income, husbands' education and the structure of employment were important in explaining stagnant female participation in urban India. Lahoti and Swaminathan (2016) found no systematic U-shaped relationship between economic development and women's labour force participation across Indian states and emphasised the composition of economic growth. Desai and Joshi (2019) similarly examined the decline in women's work participation during a period of economic growth and discussed both supply-side and demand-side explanations.

The present study differs from these earlier studies in its focus on a recent PLFS panel period and in using a transparent fixed-effects framework suitable for an undergraduate empirical research project.

4. Data

The study uses a balanced panel of 28 Indian states over five annual PLFS survey periods: 2017–18, 2018–19, 2019–20, 2020–21 and 2021–22, giving 140 state-year observations. Union Territories are excluded because their economic and demographic structures are less directly comparable with the state sample. Female LFPR is taken from the Ministry of Labour and Employment's parliamentary annexure based on PLFS, and is measured for females aged 15 years and above according to usual status (principal status plus subsidiary status). Real per-capita NSDP is taken from the Reserve Bank of India's Handbook of Statistics on Indian States, sourced from the National Statistical Office, and is measured at constant 2011–12 prices.

The five-year window is deliberately chosen to produce a balanced panel using comparable observations. The period also includes the COVID-19 shock, which makes year effects important because the pandemic affected states simultaneously but unevenly.

5. Variables and Empirical Strategy

5.1 Dependent variable

The dependent variable is the natural logarithm of real per-capita NSDP. Logging income reduces scale differences across states and allows the coefficient on FLFPR to be interpreted approximately as a percentage association with a one-percentage-point change in FLFPR.

5.2 Independent variable

The principal explanatory variable is female labour force participation rate (FLFPR), measured in percentage points for women aged 15 years and above under the usual-status approach.

5.3 Models

The baseline pooled model is:

$$\ln(\text{PCNSDP}_{it}) = \alpha + \beta \text{FLFPR}_{it} + \varepsilon_{it}$$

The preferred specification introduces state and year fixed effects:

$$\ln(\text{PCNSDP}_{it}) = \alpha + \beta \text{FLFPR}_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where μ_i captures time-invariant state characteristics and λ_t captures common year-specific shocks. Standard errors are clustered at the state level in the fixed-effects models.

Because this is an observational panel and no credible instrument or natural experiment is used, β is interpreted as an association rather than a causal effect.

6. Descriptive Results

Across the 28-state sample, the simple average female LFPR rose from 26.0% in 2017–18 to 36.1% in 2020–21, before remaining almost unchanged at 36.1% in 2021–22. The national PLFS estimate follows a similar broad upward pattern, increasing from 23.3% in 2017–18 to 32.8% in 2021–22.

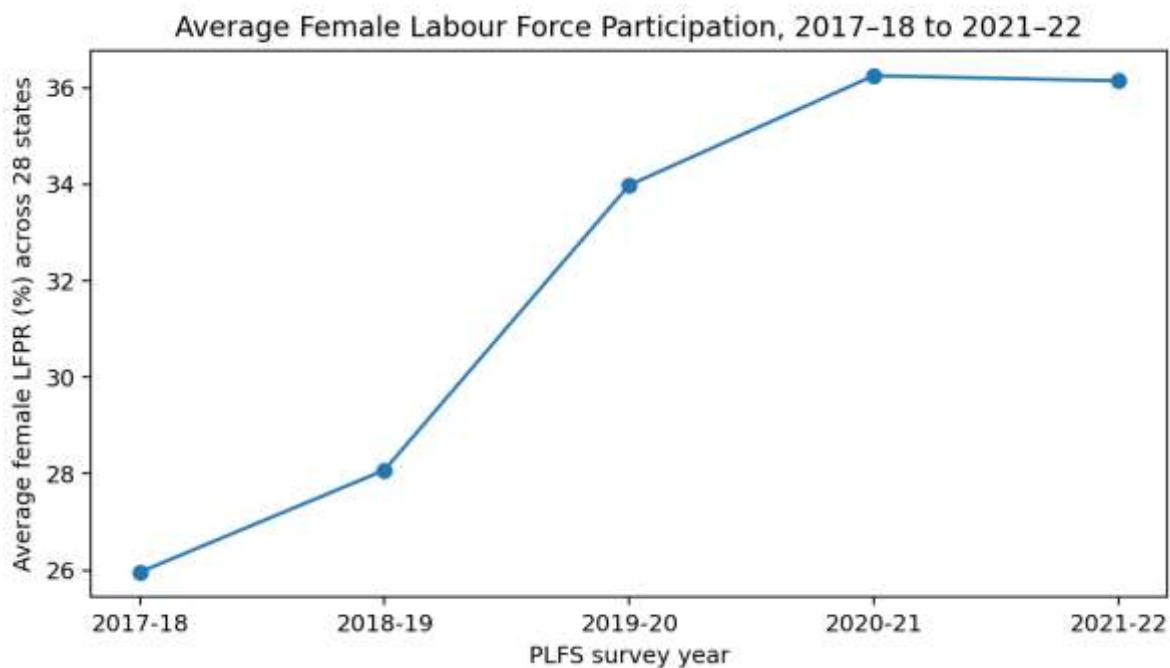


Figure 1. Average female LFPR across the 28-state sample.

There is substantial heterogeneity between states. In 2021–22, female LFPR ranged from 10.2% in Bihar to 66.1% in Himachal Pradesh within the sample. Such dispersion is useful for empirical analysis, but it also means that states differ in many dimensions besides female labour participation.

7. Regression Results

Model	FLFPR coefficient	Std. error	p-value	R ²
Pooled OLS	0.01249	0.00356	0.0004	0.0933
State fixed effects	0.00277	0.00087	0.0014	0.9943
State + year fixed effects	0.00089	0.00101	0.3778	0.9979

The pooled OLS model produces a positive coefficient of 0.01249 and is statistically significant. However, this specification compares observations across states without accounting for persistent state differences. Once state fixed effects are included, the coefficient falls to 0.00277. After adding both state and year fixed effects, the coefficient is 0.00089 with a p-value of 0.378. Thus, the preferred two-way fixed-effects model does not provide evidence of a statistically significant within-state relationship between FLFPR and real per-capita NSDP during the study period.

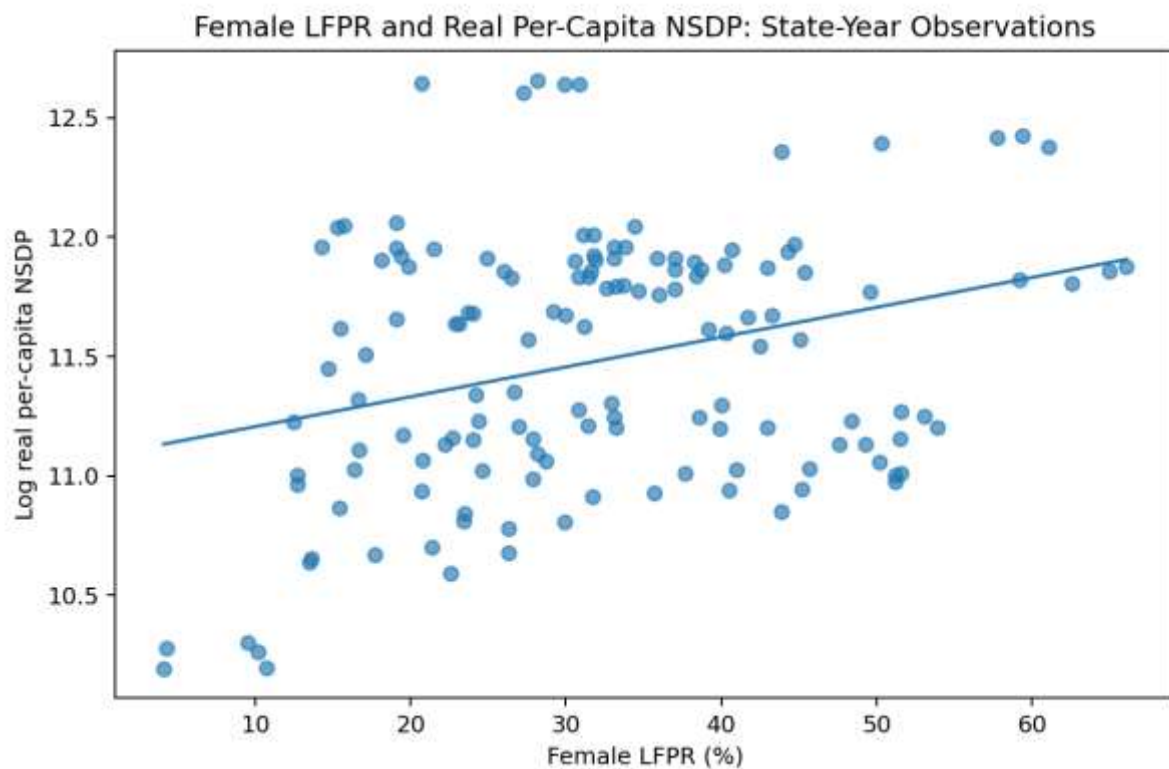


Figure 2. Female LFPR and log real per-capita NSDP across state-year observations.

8. Robustness Check

A first-difference specification examines whether changes in female LFPR are associated with changes in real per-capita NSDP:

$$\Delta \ln(\text{PCNSDP}_{it}) = \alpha + \beta \Delta \text{FLFPR}_{it} + \varepsilon_{it}$$

The estimated coefficient on the change in FLFPR is -0.00083 with a p-value of 0.507 and an R² of 0.0034. This result is again statistically insignificant. Although first differences cannot solve all endogeneity concerns, the result is consistent with the fixed-effects finding that short-run changes in female

participation do not display a strong linear association with changes in real per-capita NSDP over this period.

9. Discussion

The contrast between pooled OLS and fixed-effects estimates is economically informative. The positive pooled coefficient partly reflects persistent differences between states: states differ in industrial structure, human capital, geography, urbanisation, infrastructure, social norms and productivity. These characteristics can affect both women's labour participation and state income.

The fixed-effects model instead asks a narrower question: when a given state experiences a change in female LFPR relative to its own average, is that change systematically associated with a change in its real per-capita income after accounting for common year shocks? In this sample, the evidence does not establish such a relationship.

This does not mean that women's participation has no economic importance. The measure captures participation, not the productivity, wages or quality of employment. A rise in participation concentrated in low-productivity agriculture or unpaid family work can have a different relationship with measured NSDP than an equivalent rise in formal manufacturing or high-productivity services.

The period also contains the COVID-19 shock. The large common fall in economic activity in 2020–21 makes year fixed effects particularly relevant. Moreover, pandemic-related changes in household work, rural employment and sectoral activity may have affected female participation in ways that cannot be captured by a single income variable.

10. Policy Implications

- Policies should focus on the availability and quality of jobs for women, not only on raising the participation rate.
- Skill development should be aligned with sectors capable of generating productive and adequately paid employment for women.
- Childcare, safe transportation and workplace safety can reduce non-wage barriers to labour market participation.
- State-level policy should consider sectoral composition because participation in agriculture, informal work and formal services may have different productivity implications.
- Future policy evaluation should track wages, hours, formalisation and productivity alongside LFPR.

11. Limitations

- The study is observational and does not identify a causal effect.
- The panel contains only five annual observations per state.
- Only one main economic outcome is used, so omitted-variable bias remains possible.
- Per-capita NSDP measures economic output/income and does not fully capture welfare or unpaid household production.
- PLFS measurement is based on survey definitions and should not be interpreted as a complete measure of all forms of women's economic contribution.

12. Conclusion

This paper examined the relationship between female labour force participation and economic development across 28 Indian states over 2017–18 to 2021–22. The pooled data show a positive association, but that relationship becomes small and statistically insignificant after controlling for state-specific characteristics and common year shocks. A first-difference robustness check leads to a similar conclusion.

The central implication is methodological as well as economic: a simple cross-state correlation between female participation and income should not be interpreted as evidence that one causes the other. India's recent increase in female LFPR is economically important, but understanding its relationship with development requires attention to employment quality, sectoral transformation, household constraints and institutional conditions.

A natural extension would be a longer panel with additional controls such as female education, urbanisation, sectoral employment shares, unemployment and infrastructure. Such a model would allow a more detailed investigation of the mechanisms linking women's participation to economic performance.

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