

Women's Education, Autonomy, and Fertility Decline: A State-Level Analysis of India Using NFHS-5 Data

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Dr. Manju Lalwani Pathak

Research Guide, Principal & Head, Department of Economics Smt. Chandibai Himathmal Mansukhani College (Affiliated to University of Mumbai)

Mr. Varun Jashnani

*Research Scholar, Department of Economics Smt. Chandibai Himathmal Mansukhani College (Affiliated to University of Mumbai).
Email Id: Jashnanivarun@gmail.com*

Abstract

This study examines the relationship between women's education, household decision-making autonomy, female employment, and total fertility rate (TFR) across 31 Indian states and union territories using secondary data from the National Family Health Survey 5 (NFHS-5, 2019–21). Employing Pearson's correlation analysis and both simple and multiple ordinary least squares (OLS) regression, the study tests three hypotheses: that women's education, decision-making autonomy, and employment are each negatively associated with TFR. The findings reveal that women's decision-making autonomy is the strongest and most consistent predictor of TFR ($r = -0.658$, $p < .001$; $\beta = -0.658$ in simple regression; $\beta = -0.839$, $p = .001$ in the full model), followed by women's education ($r = -0.546$, $p = .001$), which loses significance in the multiple regression due to high collinearity with decision-making ($r = 0.828$). Female employment, contrary to expectation, shows no significant bivariate association with TFR ($r = 0.117$, $p = .529$) but becomes a positive predictor in the full model ($\beta = +0.401$, $p = .006$). The full model explains 57.3% of variance in state-level TFR ($R^2 = 0.573$, Adjusted $R^2 = 0.525$, $F(3,27) = 12.07$, $p < .001$). The study contributes macro-level evidence from India to the literature on female empowerment and demographic transition, and argues that women's autonomy, not education or employment alone, is the proximate mechanism through which human capital shapes fertility behaviour.

Keywords: total fertility rate, women's education, decision-making autonomy, female employment, demographic transition, NFHS-5, India, multicollinearity, OLS regression

1. Introduction

India's demographic transition has been one of the most consequential population transformations of the twentieth and early twenty-first centuries. From a total fertility rate (TFR) of approximately six children per woman at independence in 1947, the country has reached a national average of just 2.0 children per woman by the time of NFHS-5 (2019–21), with several states already well below replacement-level fertility of 2.1. Yet this national average conceals extraordinary inter-state heterogeneity: while Sikkim records a TFR of 1.1 and Goa 1.3, Bihar remains at 3.0 and Meghalaya at 2.9. Understanding what drives these variations is not merely a demographic question, it is central to questions of gender equity, economic development, and human capital policy.

The theoretical literature identifies several pathways through which fertility declines: rising female educational attainment, women's increasing participation in the labour market, and the expansion of women's agency and decision-making power within households. While these three factors are often treated as interchangeable proxies for women's empowerment, they are conceptually and empirically distinct. Education enhances women's knowledge and opportunity costs of childrearing. Employment provides economic independence. Autonomy - the ability to participate meaningfully in decisions about one's own health, finances, and mobility represents the direct exercise of agency. The question of which of these pathways is most powerful in determining fertility outcomes across Indian states has not been definitively answered.

This study addresses that question directly. Using state-level data from NFHS-5 for 31 Indian states and union territories, and employing correlation analysis alongside simple and multiple OLS regression, the study examines the independent and joint contributions of women's education, household decision-making autonomy, and employment to cross-state variation in TFR. The paper makes three contributions. First, it provides a rigorous state-level empirical analysis of the fertility determinants using the most recent nationally representative survey data available. Second, it disentangles the relative contributions of education, autonomy, and employment through a systematic four-model regression strategy that explicitly addresses multicollinearity. Third, it identifies an important paradox in the role of female employment in the Indian context, one with significant implications for policy. The paper is organised as follows: Chapter 2 presents the theoretical framework; Chapter 3 reviews the relevant literature; Chapter 4 describes the data and methodology; Chapter 5 reports the empirical findings

across all four regression models; and Chapter 6 concludes with policy implications and directions for future research.

2. Theoretical Framework

2.1 Demographic Transition Theory

Demographic transition theory provides the overarching macro-level framework for this study. Originally formulated by Notestein (1945) and Thompson (1929), the theory describes how societies move from high-fertility, high-mortality regimes to low-fertility, low-mortality equilibria as they undergo socioeconomic modernisation. In the third and fourth stages of this transition, rising female education and labour force participation are identified as key drivers of fertility decline, operating through increased opportunity costs of childbearing, delayed marriage, and greater access to contraception. The substantial inter-state variation in TFR observable in India - a country simultaneously traversing multiple stages of demographic transition makes it an ideal for testing the relative predictive power of these pathways

2.2 Becker's Quantity–Quality Trade-off

Becker's (1960) quantity–quality trade-off model offers the micro-economic foundation for the education–fertility link. As parental and particularly maternal education rises, the shadow price of child quality increases, incentivising households to substitute investment per child for number of children. More educated women have higher earning potential, making the opportunity cost of time devoted to childrearing greater. This model predicts a direct negative relationship between women's educational attainment and TFR, independent of other empowerment channels.

2.3 Social Capital and Women's Agency

Coleman's (1988) social capital framework and Sen's (1999) capability approach together provide the theoretical grounding for the decision-making autonomy pathway. Sen argues that fertility outcomes are fundamentally shaped by women's agency, their ability to make substantive choices about their own reproduction, healthcare, and mobility. Where women have limited agency within households, their fertility preferences may be overridden by spousal or family pressures. Where women actively participate in household decisions, as captured by the NFHS-5 indicator of participation in all three key decisions (own healthcare, major purchases, and family visits), their preference for smaller families, which NFHS-5 shows is stronger and more universally held than men's, translates more directly into actual fertility outcomes.

2.4 The Employment Paradox - Necessity vs. Empowerment

The relationship between female employment and fertility is theoretically more complex than that of education or autonomy. Standard labour supply models predict that employed women face higher opportunity costs of childrearing and should therefore have lower fertility. However, this prediction assumes that employment reflects empowerment and economic independence. In India's context, a large proportion of

female employment, particularly in rural and tribal areas, is subsistence agriculture, casual labour, or home-based work driven by poverty and economic necessity rather than career choice. Such employment does not necessarily enhance women's bargaining power within households or expand their reproductive autonomy. This theoretical distinction between necessity-driven and empowerment-driven female employment is central to interpreting the empirical findings of this study.

2.5 Conceptual Framework

The study tests the following conceptual model:

Women's Education + Decision-Making Autonomy + Employment → TFR

Each of the three independent variables is hypothesised to exert an independent negative effect on TFR, mediated through distinct but interrelated pathways. The study additionally examines whether education's effect operates independently or primarily through its enhancement of women's decision-making autonomy.

3. Review of Literature

The relationship between female education and fertility has been among the most consistently documented associations in demographic research. Behrman and Wolfe (1987), using Nicaraguan household data, demonstrated that women's schooling exerts an independent negative effect on fertility beyond income and husband's education. In the Indian context, Drèze and Murthi (2001) analysed district-level census data and established that female literacy was the strongest determinant of fertility decline across Indian states, surpassing the effects of income, poverty, and son preference. Jain (1981) provided early cross-national evidence that female education reduces fertility through multiple channels simultaneously: by raising the age at marriage, increasing contraceptive knowledge and use, and altering preferences regarding family size. Subsequent work by Cleland and Rodriguez (1988), synthesising evidence from 38 developing countries, confirmed that the negative education–fertility relationship was robust across diverse cultural and economic contexts, though the magnitude varied considerably.

The role of women's autonomy and decision-making power in shaping fertility has attracted increasing theoretical and empirical attention since the 1990s. Mason (1987) was among the first to formally distinguish women's status from their educational attainment, arguing that household bargaining power, not education, was the proximate determinant of fertility. Jejeebhoy (1995), in a comprehensive

analysis of South and Southeast Asian data, found that women's autonomy, measured by decision-making participation, freedom of movement, and access to resources, was a stronger and more direct predictor of contraceptive use and fertility preference than education in several settings. Dyson and Moore (1983) documented significant regional variation in women's autonomy within India, linking it to differences in kinship systems, marriage practices, and fertility outcomes between northern and southern states. More recently, Upadhyay et al. (2014) conducted a systematic review of 60 studies and confirmed that women's empowerment, particularly decision-making autonomy, was consistently negatively associated with fertility across developing country contexts.

The relationship between female employment and fertility is considerably more contested. The standard neoclassical prediction, that employed women have lower fertility due to higher opportunity costs, has received mixed empirical support in India. Srinivasan and James (1975) found little consistent association between female employment and fertility in Indian data, noting that the type and quality of employment mattered more than participation per se. Moursund and Kravdal (2003), using Norwegian data, showed that the employment–fertility relationship depends critically on whether employment reflects career orientation or economic necessity. In the Indian context, Vlassoff (1979) found that agricultural employment among rural women in Maharashtra was positively associated with higher fertility, as women's labour in farming was complementary to rather than

competitive with childrearing. Koolwal and van de Walle (2013) demonstrated that women's economic empowerment as distinct from mere employment was necessary for fertility effects to materialise, with employment without autonomy showing negligible fertility impacts.

At the macro level, cross-country and cross-state analyses of fertility determinants in India have grown more sophisticated with the availability of NFHS data. Guilmoto and Rajan (2001) used district-level NFHS data to document the persistence of regional fertility differentials in India, attributing them to variations in female literacy, contraceptive access, and son preference. Bhagat and Mohanty (2009) found that urbanisation, female education, and women's labour force participation jointly explained a large proportion of inter-state fertility variation, though they noted substantial multicollinearity among these predictors. The present study contributes to this literature by using the most recent NFHS-5 data, employing a transparent four-model regression strategy to manage multicollinearity, and identifying women's decision-making autonomy, rather than education or employment, as the dominant predictor of state-level TFR variation in contemporary India.

4. Research Methodology

4.1 Data Source

This study uses secondary data from the National Family Health Survey 5 (NFHS-5), conducted during 2019–21 by the International Institute for Population Sciences (IIPS), Mumbai, under the aegis of the Ministry of Health and Family Welfare, Government of India. NFHS-5 is the fifth round of India's nationally representative household survey, covering 636,699 households across all states and union territories. State-level summary statistics on key indicators, including TFR, women's educational attainment, household decision-making participation, and female employment, were extracted from the NFHS-5 State Factsheet Compendium (Phase I and Phase II). A total of 31 states and union territories for which complete data on all four variables were available constitute the analytical sample. Five smaller union territories (Lakshadweep, Dadra and Nagar Haveli, Andaman and Nicobar Islands, Puducherry, and Ladakh) were excluded due to exceptionally small population sizes that make their state-level indicators unreliable for cross-unit comparison.

4.2 Variables

The study employs the following variables:

- Dependent Variable: Total Fertility Rate (TFR) - the average number of children a woman would have over her lifetime at current age-specific fertility rates, estimated for the three years preceding the survey.
- Independent Variable 1 (X1): Women's Education - percentage of women aged 15–49 with 10 or more years of schooling, as reported in the NFHS-5 state factsheets. This is the most consistently comparable education indicator available at the state level across all NFHS-5 factsheets.
- Independent Variable 2 (X2): Women's Decision-Making Autonomy - percentage of currently married women who participate in all three key household decisions: decisions about their own healthcare, major household purchases, and visits to their own family or relatives.
- Independent Variable 3 (X3): Women Employed and Earning Cash - percentage of women aged 15–49 who were employed in the 12 months preceding the survey and earned cash for their work.

4.3 Hypotheses

The study tests the following three hypotheses:

- H1: Higher women's educational attainment (10+ years schooling) is associated with lower TFR across Indian states.
- H2: Higher women's household decision-making autonomy is associated with lower TFR across Indian states.
- H3: Higher female employment and cash earnings are associated with lower TFR across Indian states.

4.4 Analytical Strategy

Given the theoretical expectation and empirical likelihood of high correlations among the three independent variables particularly between women's education and decision-making autonomy the study adopts a four-model regression strategy recommended for contexts of multicollinearity (Malhotra & Mather, 1997):

- Model 1 (Simple Regression): TFR regressed on Women's Education only.
- Model 2 (Simple Regression): TFR regressed on Women's Decision-Making only.
- Model 3 (Simple Regression): TFR regressed on Women Employed & Cash only.
- Model 4 (Multiple Regression): TFR regressed on all three predictors simultaneously.

Prior to regression, Pearson's correlation analysis was conducted to examine bivariate associations among all variables and to quantify the degree of inter-predictor correlation. Collinearity diagnostics including the Condition Index and Variance Inflation Factors were computed for Model 4 to formally assess the extent and source of multicollinearity. All analyses were conducted in JASP (Version 0.19).

5. Data Analysis and Findings

5.1 Correlation Analysis

Table 1 presents the Pearson's correlation matrix for all four study variables. Women's decision-making autonomy exhibits the strongest negative correlation with TFR ($r = -0.658$, $p < .001$), followed by women's education ($r = -0.546$, $p = .001$). Both correlations are statistically significant and in the theoretically predicted direction, providing preliminary support for H1 and H2. Women's employment and cash earnings show a weak positive correlation with TFR ($r = +0.117$, $p = .529$) that is not statistically significant, providing no bivariate support for H3.

Critically, the correlation between women's education and women's decision-making ($r = 0.828$, $p < .001$) is very high, confirming the anticipated multicollinearity between these two predictors. Women's employment shows a moderate positive correlation with decision-making ($r = 0.352$, $p = .052$) and a small positive correlation with education ($r = 0.250$, $p = .175$), neither of which reaches significance at the 5% level.

Table 1: Pearson's Correlation Matrix

Variable 1	Variable 2	Pearson's r	p-value
TFR	Women's Education (10+ yrs)	-0.546	.001
TFR	Women Employed & Cash	+0.117	.529
TFR	Women's Decision-Making	-0.658	< .001
Women's Education	Women Employed & Cash	0.250	.175
Women's Education	Women's Decision-Making	0.828	< .001
Women Employed & Cash	Women's Decision-Making	0.352	.052

Note. $N = 31$ states/UTs. Two-tailed significance. Bold correlations indicate $p < .05$.

5.2 Model 1 - Simple Regression: Women's Education → TFR

Table 2 shows that women's education alone explains 29.9% of the variance in TFR ($R^2 = 0.299$, Adjusted $R^2 = 0.274$, $F(1,29) = 12.35$, $p = .001$). The coefficient is negative and significant ($\beta = -0.546$, $t = -3.514$, $p = .001$), confirming H1: states with higher proportions of educated women have significantly lower TFR. For every one percentage point increase in women with 10+ years of schooling, TFR decreases by 0.016 children per woman.

Table 2: Model Summary - Simple Regressions and Full Model

Model	Predictor(s)	R	R ²	Adj. R ²	RMSE	F	p
M ₀ (Null)	Intercept only	0.000	0.000	0.000	0.419	—	—
Model 1	Education only	0.546	0.299	0.274	0.357	12.35	.001
Model 2	Decision-Making only	0.658	0.433	0.414	0.321	22.17	< .001
Model 3	Employment only	0.117	0.014	−0.020	0.423	0.406	.529
Model 4	All three predictors	0.757	0.573	0.525	0.289	12.07	< .001

Note. N = 31. Dependent variable: TFR (Children per Woman).

Table 3: ANOVA - Model 1 (Women's Education → TFR)

Source	Sum of Squares	df	Mean Square	F	p
Regression	1.574	1	1.574	12.35	.001
Residual	3.696	29	0.127		
Total	5.270	30			

Note. Model 1 includes Women's Education (10+ years schooling) as sole predictor.

Table 4: Coefficients - Model 1 (Women's Education → TFR)

Predictor	Unstd. Coeff.	Std. Error	Std. Coeff. (β)	t	p
(Intercept) – M ₀	1.903	0.075	—	25.284	< .001
(Intercept) – M ₁	2.864	0.281	—	10.196	< .001
Women's Education (10+ yrs)	−0.016	0.005	−0.546	−3.514	.001

Note. H1 is supported: β = −0.546, p = .001.

5.3 Model 2 - Simple Regression: Women's Decision-Making → TFR

Model 2 is the strongest single-predictor model in the study. Women's decision-making autonomy alone explains 43.3% of TFR variance ($R^2 = 0.433$, Adjusted $R^2 = 0.414$, $F(1,29) = 22.17$, $p < .001$) substantially higher than either education or employment alone. The standardised coefficient is strong and highly significant ($\beta = -0.658$, $t = -4.708$, $p < .001$), confirming H2. States where more married women participate in all three household decisions have markedly lower TFR. The unstandardised coefficient of -0.034 indicates that a one percentage point increase in women's decision-making participation is associated with a decrease of 0.034 children per woman in TFR.

Table 5: ANOVA - Model 2 (Women's Decision-Making → TFR)

Source	Sum of Squares	df	Mean Square	F	p
Regression	2.283	1	2.283	22.17	< .001
Residual	2.987	29	0.103		
Total	5.270	30			

Note. Model 2 includes Women's Decision-Making as sole predictor.

Table 6: Coefficients - Model 2 (Women's Decision-Making → TFR)

Predictor	Unstd. Coeff.	Std. Error	Std. Coeff. (β)	t	p
(Intercept) – M_0	1.903	0.075	—	25.284	< .001
(Intercept) – M_1	4.387	0.531	—	8.266	< .001
Women's Decision-Making	-0.034	0.007	-0.658	-4.708	< .001

Note. H2 is supported: $\beta = -0.658$, $p < .001$. Strongest single predictor of TFR in the study.

5.4 Model 3 - Simple Regression: Women's Employment → TFR

Model 3 produces a null result. Women's employment and cash earnings alone explain only 1.4% of TFR variance ($R^2 = 0.014$), and the Adjusted R^2 is negative (-0.020), indicating the model performs worse than simply using the sample mean. The F-statistic is non-significant ($F(1,29) = 0.406$, $p = .529$), and the unstandardised coefficient is positive but negligible ($\beta = +0.117$, $p = .529$). H3 is not supported in bivariate analysis. This finding indicates that female employment, in the aggregate across Indian states, has no meaningful association with TFR when considered independently of education and autonomy.

Table 7: ANOVA - Model 3 (Women's Employment → TFR)

Source	Sum of Squares	df	Mean Square	F	p
Regression	0.073	1	0.073	0.406	.529
Residual	5.197	29	0.179		

Source	Sum of Squares	df	Mean Square	F	p
Total	5.270	30			

Note. Model 3 includes Women Employed and Earning Cash as sole predictor.

Table 8: Coefficients - Model 3 (Women's Employment → TFR)

Predictor	Unstd. Coeff.	Std. Error	Std. Coeff. (β)	t	p
(Intercept) – M_0	1.903	0.075	—	25.284	< .001
(Intercept) – M_1	1.762	0.234	—	7.531	< .001
Women Employed & Cash	0.004	0.007	+0.117	0.637	.529

Note. H3 is not supported in bivariate analysis: $\beta = +0.117$, $p = .529$.

5.5 Model 4 - Multiple Regression: Full Model

The full multiple regression model explains 57.3% of the variance in TFR across Indian states ($R^2 = 0.573$, Adjusted $R^2 = 0.525$), representing a substantial improvement over all three simple regression models. The overall model is highly significant ($F(3,27) = 12.07$, $p < .001$). However, the individual predictor coefficients reveal a more nuanced picture that must be interpreted in the context of the confirmed multicollinearity between women's education and decision-making.

Women's decision-making autonomy remains the dominant predictor in the full model ($\beta = -0.839$, $t = -3.604$, $p = .001$), with a larger standardised effect than in its simple regression, indicating its unique contribution to TFR even after controlling for education and employment. Women's education becomes non-significant ($\beta = +0.048$, $t = 0.215$, $p = .831$), a direct consequence of multicollinearity with decision-making ($r = 0.828$). Women's employment, which was non-significant in its simple regression, becomes a significant positive predictor in the full model ($\beta = +0.401$, $t = 2.972$, $p = .006$). This reversal from non-significant to positively significant constitutes a classic suppressor effect: when education and autonomy are held constant, states with higher female employment but lower autonomy reflecting necessity-driven employment tend to have higher TFR.

Table 9: ANOVA - Model 4 (Full Multiple Regression)

Source	Sum of Squares	df	Mean Square	F	p
Regression	3.019	3	1.006	12.07	< .001
Residual	2.250	27	0.083		
Total	5.270	30			

Note. Model 4 includes Women's Education, Women's Decision-Making, and Women Employed & Cash.

Table 10: Coefficients - Model 4 (Full Multiple Regression)

Predictor	Unstd. Coeff.	Std. Error	Std. Coeff. (β)	t	p
(Intercept) – M_0	1.903	0.075	—	25.284	< .001
(Intercept) – M_1	4.505	0.569	—	7.915	< .001
Women's Education (10+ yrs)	0.001	0.007	+0.048	0.215	.831
Women's Decision-Making	–0.043	0.012	–0.839	–3.604	.001
Women Employed & Cash	0.015	0.005	+0.401	2.972	.006

Note. Significant predictors in M_4 : Decision-Making ($p = .001$) and Employment ($p = .006$). Education non-significant due to multicollinearity with Decision-Making ($r = 0.828$).

5.6 Collinearity Diagnostics

Table 11 presents the collinearity diagnostics for Model 4. The Condition Index for Dimension 4 is 41.043, substantially exceeding the threshold of 30 that indicates serious multicollinearity. The Variance Proportion analysis reveals that both Women's Education (0.644) and Women's Decision-Making (0.995) have high variance proportions (above 0.50) on the same dimension (Dimension 4), confirming that these two variables are the source of the collinearity problem. Women's Employment shows low variance proportions across all dimensions, confirming that it is not implicated in the multicollinearity. These diagnostics formally justify the four-model analytical strategy employed in this study and reinforce the interpretation that education's non-significance in Model 4 is a statistical artefact of its overlap with decision-making rather than evidence of its theoretical irrelevance.

Table 11: Collinearity Diagnostics - Model 4

Dimension	Eigenvalue	Condition Index	VP: Intercept	VP: Education	VP: Decision-Making	VP: Employment
1	3.897	1.000	0.001	0.001	0.000	0.006
2	0.074	7.263	0.007	0.026	0.003	0.937
3	0.027	12.099	0.138	0.328	0.002	0.012
4	0.002	41.043	0.854	0.644	0.995	0.045

Note. VP = Variance Proportion. Condition Index > 30 indicates serious multicollinearity. Education and Decision-Making both show VP > 0.50 on Dimension 4, confirming collinearity between these two predictors.

5.7 Summary of Hypothesis Testing

Table 12: Summary of Hypothesis Testing Results

Hyp.	Statement	Simple Reg. β	p	Full Model β	p	Decision
H1	Women's Education $\rightarrow$ TFR	-0.546	.001	+0.048	.831	Supported (simple); Suppressed (full) — multicollinearity
H2	Decision-Making $\rightarrow$ TFR	-0.658	< .001	-0.839	.001	Supported — both models
H3	Employment $\rightarrow$ TFR	+0.117	.529	+0.401	.006	Not supported (simple); Suppressor effect (full)

Note. Simple regression β = standardised coefficient from Models 1–3. Full model β from Model 4. N = 31.

6. Conclusion

6.1 Summary of Key Findings

This study examined the determinants of total fertility rate variation across 31 Indian states and union territories using NFHS-5 data, focusing on three dimensions of women's empowerment: educational attainment, household decision-making autonomy, and employment. The analysis yields four substantive findings. First, women's decision-making autonomy is the single most powerful predictor of TFR both in simple regression ($R^2 = 0.433$) and in the full model ($\beta = -0.839$, $p = .001$), confirming that women's agency within households is the proximate mechanism through which empowerment shapes fertility outcomes in India. Second, women's education is a significant predictor of TFR in simple regression ($R^2 = 0.299$, $p = .001$) but becomes non-significant in the full model due to its very high correlation with decision-making ($r = 0.828$). This pattern strongly suggests that education reduces fertility primarily by enhancing women's decision-making autonomy rather than through a direct independent pathway. Third, women's employment shows no bivariate association with TFR but becomes a positive predictor in the full model a suppressor effect revealing that employment driven by economic necessity, uncoupled from autonomy, does not reduce and may even be associated with higher fertility. Fourth, the three variables jointly explain 57.3% of inter-state TFR variation, confirming that women's empowerment dimensions are collectively powerful determinants of India's demographic transition.

6.2 Theoretical Contributions

The study makes three theoretical contributions. First, it provides empirical resolution to the long-standing debate about whether education or autonomy is the more proximate determinant of fertility in India, finding decisively in favour of autonomy. This supports the capability approach (Sen, 1999) over purely human capital models as the more appropriate framework for understanding the empowerment–fertility relationship in the Indian context. Second, it demonstrates through systematic collinearity diagnostics and a four-model regression strategy that education and autonomy are so deeply intertwined in the Indian context that treating them as independent constructs in multivariate models leads to misleading results. Third, it exposes the employment paradox: female labour force participation, which macro-level theory typically treats as a fertility-reducing factor, has no such effect in India when it reflects economic necessity rather than empowerment. This finding challenges the use of crude female employment rates as proxies for women's empowerment in demographic analysis.

6.3 Policy Recommendations

The findings have several important implications for policy:

- Prioritise women's agency over mere enrolment: Policies aimed at reducing fertility and improving human capital should focus on enhancing women's decision-

making power within households through legal reforms on marital property rights, self-help groups, women's health committees, and community mobilisation and not merely on increasing school enrolment.

- Integrate education and empowerment: Educational interventions should be designed to strengthen women's agency, not merely transmit information. School curricula, adult literacy programmes, and vocational training should include components on reproductive rights, gender equality, and household negotiation skills.
- Distinguish empowerment-driven from necessity-driven employment: Labour policy should focus on creating quality employment for women in formal sector jobs that enhance bargaining power and provide economic independence rather than simply increasing participation rates. MGNREGA and similar schemes should be redesigned to maximise women's agency, not just their participation.
- Target high-fertility states with autonomy interventions: States such as Bihar, Uttar Pradesh, Rajasthan, and Meghalaya, which combine high TFR with low women's decision-making participation, should be prioritised for targeted autonomy-enhancing programmes under the Mission Shakti and related national schemes.
- Invest in girls' secondary and higher education: The strong simple regression relationship between education and TFR even if partly mediated by autonomy confirms that keeping girls in school through secondary level and beyond is essential to sustained fertility decline, particularly in states still in early demographic transition.

6.4 Limitations and Future Research

This study has several limitations. First, the analytical sample is limited to 31 states and union territories, which constrains statistical power. With three predictors and $N = 31$, the model meets the minimum recommended observations-to-predictor ratio of 10:1, but only marginally. Future studies should explore district-level analysis, which would provide several hundred observations, once district-level data on empowerment indicators are published from NFHS-5. Second, the cross-sectional design precludes causal inference; the observed associations are correlational, and reverse causality, whereby lower fertility itself increases women's autonomy, cannot be ruled out. Longitudinal designs using successive NFHS rounds (NFHS-3, 4, and 5 as a panel) would strengthen causal interpretation. Third, the education

variable used (10+ years schooling) is a proxy for the theoretically preferred 12+ years indicator, which was not uniformly available across all state factsheets. Fourth, the state-level analysis masks intra-state heterogeneity in both empowerment and fertility. Fifth, omitted variable bias, particularly from son preference, contraceptive access, and urbanisation, may inflate or deflate the estimated coefficients. Future research should include these variables in an expanded model, and could employ structural equation modelling to formally test the mediation hypothesis that education reduces fertility through its effect on decision-making autonomy.

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Author Details

Dr. Manju Lalwani Pathak, *Research Guide, Principal & Head, Department of Economics Smt. Chandibai Himathmal Mansukhani College (Affiliated to University of Mumbai)*

Mr. Varun Jashnani, *Research Scholar, Department of Economics Smt. Chandibai Himathmal Mansukhani College (Affiliated to University of Mumbai)*.