



FEMALE EDUCATIONAL ATTAINMENT AND CHILD MARRIAGE IN INDIA: A STATE-LEVEL ECOLOGICAL ANALYSIS OF NFHS-5 AND NFHS-6

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ABSTRACT

The legal frameworks and social interventions have steadily pushed back the age of marriage in India. However, early marriage remains a deeply ingrained issue, structured heavily by geography and access to schooling. This study examines the inverse relationship between female educational attainment and early marriage across 27 Indian states by drawing on data from National Family Health Survey rounds 5 (NFHS-5, 2019–21) and 6 (NFHS-6, 2023–24). At the national level, the proportion of women aged 20-24 married before age 18 declined from 23.3% to 20.1%, occurring alongside a 5.4 percentage-point increase in the proportion of women completing ten or more years of education. A state-level ecological correlation analysis identified a strong and statistically significant inverse association between female educational attainment and the prevalence of child marriage. State-level patterns nevertheless showed considerable heterogeneity. Early-marriage prevalence declined in 23 of the 27 states, while four states including Goa, Himachal Pradesh, Nagaland and Punjab recorded higher point estimates in NFHS-6 than in NFHS-5. However, the persistence of relatively high child-marriage prevalence in some states despite rising educational attainment indicates that educational expansion should be considered alongside wider socioeconomic and social-norm conditions. The findings indicate that higher state-level female educational attainment is strongly associated with lower child-marriage prevalence while substantial subnational variation persists. The persistence of high-prevalence states and deviations from the overall pattern suggests that educational expansion needs to be considered alongside broader socioeconomic and social-norm conditions.

KEYWORDS: Child Marriage, Educational Attainment, National Family Health Survey (NFHS), State-Level Inequality, Women's Education, Rural-Urban Differences, India.

1. INTRODUCTION

Child marriage refers to marriage involving a girl below 18 years and a boy below 21 years under the Prohibition of Child Marriage Act, 2006 in India. However, in this study, child marriage is operationalised using the NFHS indicator of women aged 20–24 years who were first married before age 18 (Anisetty, 2025; Naik et al., 2024; Shukla et al., 2024). Over recent decades, India has recorded a substantial decline in early marriage. The proportion of women aged 20–24 years who were married before age 18 has fallen from 49.4% in NFHS-1 (1992–93) to 23.3% in NFHS-5 (2019–21) and 20.1% in NFHS-6 (2023–24) (Gausman et al., 2024; Paul, 2020). Early marriage exposes adolescent girls to a range of adverse outcomes including premature pregnancy, elevated maternal and infant mortality, inadequate utilization of maternal healthcare services and an increased risk of intimate partner violence (Paul & Chouhan, 2019; Raj et al., 2009; Seth et al., 2018). Longitudinal and cross-sectional studies further associate child marriage with long-term chronic health vulnerabilities such as an elevated risk of adult hypertension, depressive symptoms and suicidality (Aggarwal et al., 2023; Tiwari et al., 2023). Sociologically, the practice curtails young women's personal autonomy, restricts social mobility, reinforces patriarchal power structures and traps young women in intergenerational cycles of poverty (Anisetty, 2025; Lal, 2015). Female educational attainment is consistently identified in the literature as an important correlate of delayed marriage among girls in India and across South Asia (Paul, 2019; Raj et al., 2014; Shukla et al., 2024; Srinivasan et al., 2015). Increased schooling particularly secondary and higher secondary completion delays marriage timing by enhancing girls' self-efficacy which fosters labour market aspirations and provides a socially acceptable alternative to early nuptials (Bhabha & Kelly, 2013; Paul, 2020; Raj et al., 2019). Conversely, low educational attainment and school dropout strongly correlate with higher rates of early marriage that reflect a bidirectional relationship: dropping out of school heightens vulnerability to child marriage, while early marriage frequently forces school cessation due to domestic responsibilities or childbearing (MacQuarrie & Juan, 2019; Mishra, 2025; Roest, 2016; Singh & Vennam, 2016). Despite overall national progress, persistent rural-urban divides and geographic disparities remain stark across the country (MacQuarrie & Juan, 2019; Modak, 2019; Sen et al., 2025). According to NFHS-5 (2019-21) estimates, 27.0% of women aged 20-24 in rural areas were married before age 18, compared to 14.7% in urban areas (Mishra, 2025; Paul, 2020; Sen et al., 2025). This divide is driven by structural inequalities in rural settings, including severe household poverty, limited secondary educational infrastructure, geographic remoteness and stronger adherence to traditional patriarchal norms (Anisetty, 2025; Modak, 2019; Seth et al., 2018; Srinivasan et al., 2015).

Although national policy initiatives (such as the Prohibition of Child Marriage Act of 2006 and the *Beti Bachao Beti Padhao* scheme) have worked to dismantle these drivers, subnational trends suggest that the pace of decline varies considerably and may be decelerating or stagnating in high-prevalence hotspots (Gausman et al., 2024; Naik et al., 2024). Evaluating whether educational expansion continues to uniformly protect adolescent girls across different states is essential for targeted policy design. Although



previous studies have examined the determinants and spatial variation of child marriage in India, relatively limited attention has been given to comparing the state-level association between female educational attainment and child-marriage prevalence across the two most recent NFHS rounds. Existing research has frequently relied on individual or household-level analyses, earlier survey rounds or broader multivariate determinants. A comparative ecological assessment using NFHS-5 and NFHS-6 can therefore provide a recent picture of whether the state-level education-child marriage association remains consistent during a period of continuing educational expansion and declining child-marriage prevalence. Thus, this paper aims to conduct a state-level ecological analysis comparing the National Family Health Survey 5 (NFHS-5, 2019–21) and the National Family Health Survey 6 (NFHS-6, 2023–24) to examine the direction and strength of the association between female educational attainment and child-marriage prevalence across Indian states over this comparative period.

2. LITERATURE REVIEW

2.1 Socio-Cultural and Economic Drivers of Early Marriage in India: Literature across demography, public health and sociology consistently frames early marriage in India as a complex product of entrenched socio-cultural norms, patriarchal power structures and economic vulnerability (Anisetty, 2025; Lal, 2015). Widespread household poverty serves as a primary economic catalyst; in resource-constrained families, daughters are frequently perceived as economic liabilities, leading parents to utilize early marriage as a financial coping strategy to shift the girl's living and healthcare costs to her marital home (Anisetty, 2025; Das & Roy, 2020; Paul, 2019, 2020). This economic motive operates in tandem with the traditional practice of dowry which exerts downward pressure on the age at marriage because dowry demands typically escalate with a girl's advancing age and higher educational attainment, incentivizing low-income households to marry off daughters early to minimize nuptial expenditures (Goli, 2016; Sharma et al., 2020; Lal, 2015). Sociologically, patriarchal norms construct gendered expectations that devalue female capabilities by often viewing girls as temporary natal family members (*paraya dhan*) meant strictly for domestic and reproductive roles (Mishra & Banerjee, 2020; Singh & Vennam, 2016). Deeply rooted social concerns regarding female chastity, sexual purity and family honor (*izzat*) intensify upon menarche that prompts parents to enforce mobility restrictions that result in withdrawing girls from school and arranging early marriages to safeguard against premarital relationships or social stigma (Beattie et al., 2019; Seth et al., 2018; Srinivasan et al., 2015). These drivers intersect with socio-economic stratification where historically marginalised communities including Scheduled Castes (SC), Scheduled Tribes (ST) and economically deprived religious minorities exhibit heightened vulnerability to early nuptials due to cumulative structural deprivations and endogamous marriage customs (Beattie et al., 2019; Paul, 2020; Sen et al., 2024).

2.2 The Rural-Urban Divide in Marital Timing: A pervasive theme in Indian nuptiality research is the stark and persistent rural-urban disparity in marital timing (MacQuarrie & Juan, 2019; Mishra, 2025; Sen et al., 2024). Empirical analyses across multiple national survey rounds demonstrate that adolescent girls and young women residing in rural areas face significantly higher odds of marrying before the legal age of 18 compared to their urban peers, a divergence reflected in National Family Health Survey estimates showing rural child marriage prevalence at approximately 27.0% compared to 14.7% in urban areas (Mishra, 2025; Paul, 2020; Sen et al., 2024). Scholars attribute this geographical gap to severe structural deficits in rural environments, including higher rates of multi-dimensional poverty, limited secondary school infrastructure, geographic remoteness, inadequate public transport and a scarcity of formal non-agricultural employment options for young women (Anisetty, 2025; Brahmapurkar, 2017; Erulkar, 2013; Modak, 2019; Seth et al., 2018). Moreover, rural communities often experience stronger adherence to traditional gender roles and heightened community surveillance regarding family honor (Modak, 2019; Lal, 2015). By contrast, urban environments generally offer greater access to secondary and tertiary educational institutions, wider exposure to mass media and greater participation in modern labor markets, all of which foster higher age at first marriage (Naik et al., 2024; Paul, 2020). However, researchers caution that urban residence does not offer universal immunity against early nuptials; urban informal settlements, poor households and migrant populations remain vulnerable to early marriage due to localized economic distress, safety concerns and fears of urban crime or harassment (Modak, 2019; Naik et al., 2024).

2.3 Female Educational Attainment and Marriage Postponement: Across empirical studies, female educational attainment consistently emerges as an important factor associated with lower child-marriage prevalence in India (Paul, 2019; Raj et al., 2014; Shukla et al., 2024). However, literature highlights a critical threshold effect: while primary education alone yields minimal or inconsistent protective effects against underage marriage, completing secondary and higher secondary education (10 or more years of formal schooling) serves as the primary structural threshold that substantially reduces the likelihood of early nuptials (Raj et al., 2014; Shukla et al., 2024; Srinivasan et al., 2015). Theoretical frameworks explain this protective association through several complementary mechanisms. First, prolonged school retention enhances adolescent girls' self-efficacy, agency and decision-making autonomy, empowering them to express marital preferences and negotiate timing with parents (Bhabha, 2013; Paul, 2020; Raj et al., 2019). Second, secondary schooling alters parental and community calculations regarding the returns on human capital, opening viable post-education employment pathways and career aspirations that compete directly with early marriage (Pourtaheri et al., 2023; Roest, 2016; Singh & Vennam, 2016). Third, the school environment physically occupies girls' time during critical adolescent years, creating an institutional alternative to premature family formation (Roest, 2016; Singh & Vennam, 2016). Scholars emphasize the bidirectional dynamic governing this relationship, where premature school dropout heightens immediate vulnerability to child marriage, while early marriage almost universally forces school cessation due to domestic responsibilities, marital cohabitation and early pregnancy (MacQuarrie & Juan, 2019; Mishra, 2025; Roest, 2016).



The literature indicates that educational attainment, household economic conditions, rural residence, gender norms and access to schooling are closely knotted with the timing of marriage in India. However, much of the existing evidence examines individual and household-level determinants while state-level comparisons across the latest NFHS rounds remain comparatively limited. This study addresses this gap by examining whether the aggregate association between female educational attainment and child-marriage prevalence is observable and temporally consistent across Indian states using NFHS-5 and NFHS-6.

3. DATA AND METHODOLOGY

3.1 Study Design and Scope: This study employs a state-level ecological, repeated cross-sectional comparative design to examine the subnational relationship between female educational attainment and early marriage in India across two recent survey periods (Gausman et al., 2024; Paul, 2019). An ecological framework is appropriate for assessing population-level structural association trends that evaluate how aggregate gains in female education correspond to shifts in the prevalence of underage marriage across administrative boundaries over time (Beattie et al., 2019; Shukla et al., 2024; Srinivasan et al., 2015).

The unit of analysis comprises 27 Indian States. Union Territories (UTs) were excluded from the spatial matrix due to their distinct administrative, demographic and population scale characteristics as well as potential volatility in small-sample population estimates (Gausman et al., 2024; Sen et al., 2025). Furthermore, Manipur was excluded because NFHS-6 estimates were not available for the state. Union Territories were excluded to maintain a state-only analytical frame. Because this indicator covers women aged 15-49 years rather than the 20-24 year cohort used for the child-marriage indicator, it should be interpreted as a broader state-level proxy for female educational attainment rather than as a direct measure of the schooling of women exposed to the measured child-marriage outcome. The analytical sample comprised the 27 states for which comparable NFHS-5 and NFHS-6 estimates were available, as follows:

Table 1: State-Level Female Educational Attainment and Early Marriage Prevalence (NFHS-5 and NFHS-6)

State	NFHS_5_Educational_Pct	NFHS_5_Early_Marriage_Pct	NFHS_6_Education_Pct	NFHS_6_Early_Marriage_Pct
Andhra Pradesh	39.6	29.3	48.4	25.1
Arunachal Pradesh	39.4	18.9	50.4	17.3
Assam	29.6	31.8	37.1	25.3
Bihar	28.8	40.8	33.1	34.6
Chhattisgarh	36.9	12.1	41.9	10.1
Goa	71.5	5.8	66.5	6.8
Gujarat	33.8	21.8	38.6	18.0
Haryana	49.5	12.5	55.2	11.9
Himachal Pradesh	65.9	5.4	72.1	7.9
Jharkhand	33.2	32.2	39.5	28.1
Karnataka	50.2	21.3	57.6	15.3
Kerala	77.0	6.3	86.6	2.9
Madhya Pradesh	29.3	23.1	33.7	20.0
Maharashtra	50.4	21.9	55.4	19.7
Meghalaya	35.1	16.9	37.5	13.8
Mizoram	50.0	8.0	54.7	6.0
Nagaland	44.4	5.6	46.3	10.2
Odisha	33.0	20.5	43.9	18.6
Punjab	56.0	8.7	60.6	10.2
Rajasthan	33.4	25.4	38.7	24.6
Sikkim	49.0	10.8	58.4	9.1
Tamil Nadu	56.6	12.8	64.2	10.5
Telangana	45.5	23.5	51.1	17.9
Tripura	23.2	40.1	32.9	34.0
Uttar Pradesh	39.3	15.8	42.5	13.7
Uttarakhand	50.4	9.8	56.1	8.2
West Bengal	32.9	41.6	40.0	36.4

(Variables: Education = Women 15-49 with 10 or more years of schooling; Early Marriage = Women 20-24 married before age 18)

3.2 Data Sources: Data were extracted from the official State Fact Sheets of the National Family Health Survey (NFHS-5, 2019-21) and NFHS-6 (2023-24), conducted under the stewardship of the Ministry of Health and Family Welfare (MoHFW), Government of India, with the International Institute for Population Sciences (IIPS), Mumbai, serving as the nodal agency. The analysis uses two indicators reported in the NFHS state-level fact sheets: (i) the percentage of women aged 15-49 years with 10 or more years of schooling and (ii) the percentage of women aged 20-24 years who were married before age 18. The NFHS provides nationally and subnationally representative demographic, health and socioeconomic indicators using standardized survey procedures and sampling



designs. For the present study, the state-level estimates were extracted and matched across the two survey rounds to construct a comparable 27-state analytical dataset.

3.3 Operationalization of Variables and data analysis: To ensure comparability across NFHS-5 and NFHS-6 fact sheets, key indicators were operationalised strictly according to standardised demographic definitions:

- **Dependent Variable (DV)-Prevalence of Early Marriage:** Operationalised as the percentage of women aged 20–24 years who were first married or in a formal union before attaining the legal age of 18 years (IIPS, 2024; IIPS & ICF, 2021). Focusing on the 20-24 age cohort reflects recent nuptiality practices among young women while avoiding censoring bias associated with younger adolescent cohorts (Gausman et al., 2024; Paul, 2020; Raj et al., 2014).
- **Explanatory Variable-Female Educational Attainment:** Female educational attainment was operationalised as the percentage of women aged 15–49 years with 10 or more years of schooling (IIPS, 2024; IIPS & ICF, 2021). The indicator was selected because previous research has consistently identified extended schooling, particularly at the secondary level and beyond, as an important correlate of delayed marriage (Raj et al., 2014; Shukla et al., 2024; Srinivasan et al., 2015).

The statistical analysis was conducted in two primary stages:

1. **Descriptive and Comparative Trend Analysis:** State-level estimates from NFHS-5 (2019-21) and NFHS-6 (2023-24) were compiled for both the dependent and independent variables. Percentage-point (pp) changes between the two rounds were computed to identify trajectory patterns, calculated as the NFHS-6 prevalence minus the NFHS-5 prevalence, thereby describing subnational changes in early-marriage prevalence across individual states (Gausman et al., 2024; Naik et al., 2024).
2. **Bivariate Cross-Sectional Ecological Correlation Analysis:** Pearson product-moment correlation coefficients (r) were estimated separately for NFHS-5 and NFHS-6 across the 27 states to examine the direction and strength of the state-level association between female educational attainment and child-marriage prevalence. Two-tailed significance testing ($p < .05$ and $p < .01$) was applied to assess whether the observed correlations differed significantly from zero. The correlation coefficients from the two survey rounds were compared descriptively to assess whether the direction and approximate magnitude of the association were similar across the two periods.

First, the analysis is ecological and uses state-level aggregate indicators. Therefore, the findings are subject to the ecological fallacy and cannot be interpreted as evidence of individual-level relationships. A state with higher female educational attainment and lower child-marriage prevalence does not imply that an individual woman with more schooling is necessarily less likely to marry early. Second, the education and early-marriage indicators are based on different age groups, which limits direct individual-level interpretation. Third, the analysis includes only two survey rounds, restricting assessment of longer-term temporal dynamics. So, the bivariate correlations do not account for other state-level factors such as household wealth, rurality, social group composition, employment opportunities or regional differences. In addition, observed percentage-point changes between survey rounds should be interpreted cautiously because the study uses published point estimates rather than respondent-level data and does not incorporate the sampling errors or confidence intervals of the state estimates.

4. RESULTS

4.1 Descriptive Changes and State Inequalities: Comparative state-level analysis between the National Family Health Survey 5 (NFHS-5, 2019-21) and National Family Health Survey 6 (NFHS-6, 2023–24) demonstrates ongoing national progress alongside persistent subnational inequality in female age at marriage and educational attainment (Gausman et al., 2024; IIPS, 2024; Shukla et al., 2024). Indian states continued a long-term trajectory of declining child marriage prevalence, with the average proportion of women aged 20-24 years married before age 18 decreasing across the majority of states (Gausman et al., 2024; IIPS, 2024). Simultaneously, Female educational attainment increased in 26 of the 27 states, while Goa recorded a decline in the reported 10+ years-of-schooling indicator (Beattie et al., 2019; IIPS, 2024; Mishra, 2025).

However, state-level analysis reveals marked geographic heterogeneity and persistent regional clustering (MacQuarrie & Juan, 2019; Sen et al., 2024; Srinivasan et al., 2015). The highest state-level prevalence estimates in the analytical sample were observed in West Bengal, Bihar, Tripura and Jharkhand, highlighting substantial subnational differences in child-marriage prevalence (Gausman et al., 2024; IIPS, 2024; Naik et al., 2024; Paul, 2020). On the other hand, southern and northern states such as Kerala, Goa, Himachal Pradesh and Punjab maintain substantially lower baseline prevalence levels (Gausman et al., 2024; IIPS, 2024). Moreover, cross-round comparisons reveal an exceptionally strong cross-round consistency in state-level estimates across the two survey waves. State-level female educational attainment in NFHS-5 was nearly perfectly correlated with female educational attainment in NFHS-6 ($r = 0.970$, $p < .001$) and NFHS-5 early marriage prevalence displayed near-identical persistence with NFHS-6 early marriage rates ($r = 0.981$, $p < .001$) (IIPS, 2024). These strong cross-round correlations indicate that while absolute national rates are improving, substantial differences in state-level prevalence and educational attainment persist across the two survey periods (Gausman et al., 2024; IIPS, 2024; Sen et al., 2024).

4.2 Rural-Urban Context: Although rural-urban variation is not directly analysed in the present state-level correlation framework, NFHS indicators provide important contextual evidence for interpreting the observed subnational differences. Residential stratification remains one of the most prominent axes of nuptial inequality in India (MacQuarrie & Juan, 2019; Mishra, 2025; Sen



et al., 2024). Across both survey periods, women aged 20-24 residing in rural areas experienced substantially higher rates of underage marriage compared to their urban counterparts (IIPS, 2024; Paul, 2020; Sen et al., 2024). In NFHS-5, rural child marriage prevalence among women aged 20-24 stood at 27.0%, compared to 14.7% in urban areas (IIPS, 2024; Mishra, 2025; Sen et al., 2024). Data from NFHS-6 demonstrate that although both sectors recorded incremental improvements, NFHS-6 continues to show a substantial national rural-urban difference (IIPS, 2024).

This enduring gap is driven by localised structural deficits in rural sectors including higher rates of multi-dimensional household poverty, inadequate secondary school infrastructure, geographic remoteness and heightened community enforcement of traditional patriarchal gender roles (Anisetty, 2025; Modak, 2019; Seth et al., 2018; Srinivasan et al., 2015). In rural environments, adolescent school cessation continues to trigger rapid transition into marriage, as families often lack viable post-primary educational or formal employment alternatives for daughters (Beattie et al., 2019; Mishra, 2025; Roest, 2016). By contrast, urban residence offers broader structural protections through proximity to higher educational institutions and modern labour market opportunities, although urban informal settlements and low-income pockets remain vulnerable to localised economic shocks (Modak, 2019; Naik et al., 2024; Paul, 2020).

4.3 Correlation between Education and Early Marriage: To evaluate the macro-level association between female educational attainment and early marriage over time, Pearson product-moment correlation coefficients (r) were calculated across the 27 sample states for NFHS-5 (2019–21) and NFHS-6 (2023–24). Table 2 presents the bivariate correlation matrix linking the proportion of women with 10 or more years of schooling to the prevalence of early marriage among women aged 20-24 across both survey waves.

Table 2: Pearson Correlation Matrix of State-Level Female Education and Early Marriage (NFHS-5 and NFHS-6)

Variable	1	2	3	4
1. NFHS-5: Female Education (10+ Years)	—			
2. NFHS-5: Married Before Age 18	-0.756*	—		
3. NFHS-6: Female Education (10+ Years)	0.970*	-0.701*	—	
4. NFHS-6: Married Before Age 18	-0.769*	0.981*	-0.727*	—

*Note: Values are Pearson correlation coefficients calculated from the 27 state-level aggregate observations provided in Table 1. Education represents the percentage of women aged 15–49 years with 10 or more years of schooling; early marriage represents the percentage of women aged 20-24 years married before age 18. Correlation coefficients and significance levels are authors' calculations. * $p < .001$ (two-tailed).*

The correlation matrix reveals several key empirical patterns regarding the strength, direction and temporal stability of the relationship between female education and early marriage:

- Strong Cross-Sectional Inverse Association:** In NFHS-5 (2019-21), state-level female educational attainment exhibited a statistically significant, strong inverse correlation with child-marriage prevalence ($r = -0.756$, $p < .001$). In NFHS-6 (2023-24), the corresponding association was also strong and statistically significant ($r = -0.727$, $p < .001$). States with higher proportions of women completing 10 or more years of schooling generally recorded lower levels of child-marriage prevalence across both survey periods.
- Cross-Round Ecological Association:** Baseline female education in NFHS-5 was strongly and inversely correlated with future early marriage rates in NFHS-6 ($r = -0.769$, $p < .001$), while baseline early marriage in NFHS-5 was strongly inversely correlated with subsequent female educational attainment in NFHS-6 ($r = -0.701$, $p < .001$) (IIPS, 2024). The cross-round associations show persistence in the relative position of states across the two survey periods, but they do not establish temporal causation or bidirectional effects. States with higher child-marriage prevalence also tended to have lower educational attainment. These patterns should be interpreted as ecological associations rather than evidence of causal or bidirectional effects (MacQuarrie & Juan, 2019; Raj et al., 2014; Shukla et al., 2024).
- Similarity of the Inverse Association Across Survey Rounds:** The correlation coefficients were similar in magnitude in NFHS-5 ($r = -0.756$) and NFHS-6 ($r = -0.727$), indicating that the strong inverse state-level association between female educational attainment and child-marriage prevalence was similar across the two survey rounds. The high cross-round correlations for female educational attainment ($r = 0.970$, $p < .001$) and child-marriage prevalence ($r = 0.981$, $p < .001$) further indicate substantial persistence in the relative position of states across the two survey periods (Gausman et al., 2024; IIPS, 2024; Paul, 2019; Shukla et al., 2024).

5. DISCUSSION

The empirical findings of state-level ecological analysis provide critical insights into the evolving landscape of female education and early marriage in India between the National Family Health Survey 5 (NFHS-5, 2019-21) and National Family Health Survey 6 (NFHS-6, 2023-24). The data demonstrate positive national progress, marked by a 3.2 percentage-point reduction in the national prevalence of early marriage among women aged 20-24 years and a concurrent 5.4 percentage-point increase in female educational attainment (operationalized as 10 or more years of schooling among women aged 15-49 years) (IIPS, 2024). Crucially, the bivariate correlation between state-level female educational attainment (10+ years of schooling) and early marriage remained highly stable across survey waves ($r = -0.756$ in NFHS-5; $r = -0.727$ in NFHS-6, $p < .001$) (IIPS, 2024). This similarity across the two survey



rounds indicates that the inverse association between aggregate female educational attainment and early-marriage prevalence remained strong across the two survey rounds (Gausman et al., 2024; Paul, 2019; Shukla et al., 2024).

5.1 Possible Mechanisms Suggested by the literature: The enduring strength of this protective relationship aligns closely with established demographic and sociological literature (Beattie et al., 2019; Raj et al., 2014; Roest, 2016). Previous research suggests that the association between prolonged schooling and later marriage may operate through several mechanisms:

- a. **Threshold Effect of Secondary Retention:** Literature emphasises that while primary education yields minimal protective returns against early marriage, completing 10 or more years of schooling reaches a critical developmental threshold (Raj et al., 2014; Shukla et al., 2024). Higher aggregate female educational attainment is associated with greater participation in formal schooling during the adolescent years which may provide an institutional alternative to premature family formation and cohabitation (Beattie et al., 2019; Roest, 2016; Singh & Vennam, 2016).
- b. **Agency and Employment Aspirations:** Prolonged school retention enhances adolescent girls' self-efficacy, cognitive agency and health literacy, empowering them to negotiate marital timing with parents and express personal life preferences (Bhabha, 2013; Paul, 2020; Raj et al., 2019). Furthermore, secondary education shifts parental expectations regarding returns on human capital, fostering career aspirations and prospective labor market opportunities that compete directly with early marriage (Anisetty, 2025; Roest, 2016; Singh & Vennam, 2016).
- c. **Disruption of the Schooling-Marriage Pathway:** Previous research indicates that school discontinuation and early marriage are frequently interconnected, with withdrawal from schooling potentially increasing exposure to pathways leading toward marriage, while marriage itself can interrupt educational participation because of domestic responsibilities, marital cohabitation and childbearing (MacQuarrie & Juan, 2019; Mishra, 2025; Seth et al., 2018). Maintaining girls' participation through secondary grades may therefore help reduce some pathways associated with early marriage (Mishra, 2025; Raj et al., 2014).

5.2 Subnational Heterogeneity and Deviations from the Overall Pattern: Despite general national progress and the overall stability of the inverse correlation, subnational distinctions reveal notable exceptions. Early-marriage prevalence declined in 23 of the 27 states while four states including Goa, Himachal Pradesh, Nagaland and Punjab recorded higher point estimates in NFHS-6 than in NFHS-5. These differences should be interpreted cautiously because changes in survey estimates do not necessarily indicate a corresponding change in the underlying prevalence (Gausman et al., 2024; IIPS, 2024; Sen et al., 2024). Previous research identifies several mechanisms that may help contextualise deviations from the overall pattern, although the present ecological analysis does not directly test these explanations.

- **Post-Pandemic Economic and Educational Disruptions:** The COVID-19 pandemic represents one contextual factor that may have affected schooling continuity and household economic conditions during the period covered by the two surveys. Previous research has documented concerns about school disruption, economic stress and heightened vulnerability to child marriage during and following the pandemic (Anisetty, 2025; Sen et al., 2024; Yukich et al., 2021). However, the present analysis cannot establish whether pandemic-related disruption explains the observed state-level changes in child-marriage prevalence.
- **Resilience of Cultural and Social Norms:** In certain state contexts, traditional social norms, ethnic endogamy and patriarchal expectations surrounding female chastity and family honor can override educational gains (Modak, 2019; Seth et al., 2018; Srinivasan et al., 2015). When educational expansion is not accompanied by broader employment opportunities and changes in social norms, the association between educational attainment and delayed marriage may not be uniform across social and geographical contexts (MacQuarrie & Juan, 2019; Modak, 2019; Roest, 2016).

6. CONCLUSION AND POLICY RECOMMENDATIONS

This state-level analysis demonstrates that while India continues to make steady progress in curbing underage marriage. The inverse association between female educational attainment and child-marriage prevalence remains substantial across states. However, national averages mask deeply entrenched subnational inequalities, persistent rural-urban divides and differences in point estimates across survey rounds in select states. To accelerate progress toward Sustainable Development Goal 5.3 (eliminating child, early and forced marriage by 2030), policy interventions must shift from generalised national campaigns to targeted, context-specific strategies:

- **Prioritize Rural Secondary Infrastructure:** Given that rural girls face significantly higher child marriage prevalence (27.0% in NFHS-5) due to distance, poverty and structural deficits, state governments must expand secondary and higher secondary school infrastructure in rural and remote habitations (Mishra, 2025; Paul, 2019, 2020; Sen et al., 2024). Establishing free and safe transportation (such as bicycle schemes) and secure residential schooling facilities (such as Kasturba Gandhi Balika Vidyalayas) may help address safety concerns and reduce school dropout at the upper primary-to-secondary transition (Beattie et al., 2019; Sen et al., 2024; Singh & Vennam, 2016).
- **Strengthen Conditional Cash Transfers and Legal Enforcement:** State-level conditional cash transfer (CCT) schemes (e.g., *Kanyashree Prakalpa* in West Bengal), alongside broader national initiatives aimed at improving girls' education and delaying marriage, should be aligned with educational retention and delayed marriage objectives (Anisetty, 2025; Mishra, 2025; Naik et al., 2024; Sen et al., 2024). Concurrently, administrative implementation of the Prohibition of Child Marriage Act (PCMA, 2006)



must be strengthened by empowering dedicated Child Marriage Prohibition Officers (CMPOs) and fast-tracking legal accountability mechanisms in high-prevalence hotspots (Anisetty, 2025; Mishra, 2025).

- **Combine Education with Economic Pathways and Social Norm Campaigns:** Education may have limited effects when young women lack access to formal economic opportunities. Interventions should integrate secondary schooling with vocational skills training, mentorship and economic empowerment initiatives (Anisetty, 2025; Mehra et al., 2018; Raj et al., 2019). Furthermore, community-level programs involving local leaders, village councils (*Panchayats*) and male youth are essential to dismantle patriarchal norms surrounding female honour, dowry and early cohabitation (Anisetty, 2025; Seth et al., 2018; Singh & Vennam, 2016).

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