

Child Loss among Adolescent Mothers in India: Associations with Consanguineous Marriage, Child Marriage and Teenage Childbirth

S. Radhakrishnan

National Specialist, Monitoring and Evaluation, International Justice Mission.

Original Article

Abstract

Introduction: Women who are bearing children during their teenage years are at increased risk of physical and mental health problems. According to NFHS-5, seven percent of women aged 15–19 have begun childbearing; 5 percent of women have had a live birth and 2 percent of women are pregnant with their first child. Child marriage remains widespread in several northern Indian states and is a major driver of early and high risk fertility. Consanguineous marriage, also prevalent in parts of India, may further compound reproductive risks. Child marriage directly leads women to become sexually active and drives early reproductive childbearing. This study examines how consanguineous marriage, child marriage, and teenage pregnancy individually and jointly influence pregnancy outcomes, particularly child loss, among adolescent women in India.

Method: Data were drawn from the National Family Health Survey (NFHS-5), focusing on women aged 15–19 years. Descriptive statistics and chi-square tests were used to assess associations between key predictors and child loss. Univariate and bivariate analyses, followed by binary logistic regression, were conducted to estimate the independent and combined effects of consanguinity, age at marriage, and teenage pregnancy on the likelihood of child loss.

Results: Both consanguineous marriage and child marriage individually increase the risk of health complications and the intertwined combination of these factors increases the probability of first child death. Omnibus tests show that consanguineous marriage and child marriage in the model are highly significant ($\chi^2(5,5462) = 25.278, p < 0.01$) for child loss. Furthermore, women who married at the age of 18 or above have 1.2 times higher odds of having a child alive than women who experienced child marriage.

Conclusion: Consanguineous marriage and child marriage substantially elevate the risk of child loss among adolescent mothers in India, and their combined effect is particularly detrimental. Interventions that raise educational attainment, reduce poverty, delay age at marriage, and increase awareness of the risks of consanguinity and early pregnancy are essential to improving reproductive outcomes for young women.

Key Words: child deformities, child marriage, child loss, consanguineous marriage, first delivery outcome, health complications, teenage pregnancy

Introduction

Women who are childbearing during their teenage years are at risk of physical and mental health problems. Irwan M. Hidayana explains that teenage pregnancy is associated with poor economic and social conditions [1]. Teenage pregnancy has immediate and long-term impacts on health, education and economy, he added [1]. According to NFHS-5, seven percent of the women aged 15-19 have begun childbearing; 5 percent of women have had a live birth and 2 percent of women are pregnant with their first child [2]. Evidently teenage childbearing is relatively higher in rural areas. Eight percent of women in rural areas in the age group 15-19 have begun childbearing. One-third (32%) of the women have reported that the age at first union is below 18 years, which is considered as the "child marriage". Child marriage is one of the major factors affecting women's health and is prevalent in the northern states of India. Many studies have revealed that consanguineous marriage also affects women's health. Many studies explain that consanguineous marriage leads to child deformities, and that early marriage puts women at risk of delivery complications and forces them into teenage childbearing. Children born to consanguineous parents may have biological deformities at birth. Child marriage directly leads women to become sexually active and pushes them into reproductive childbearing.

The paper attempts to understand how the combinations of the consanguineous marriage, women who married before the age of 18 (child marriage) and teenage pregnancy affect women, placing them at higher health risk and increasing the likelihood of experiencing first delivery outcome as child loss. The research hypotheses are given below.

- There is a significant association between consanguineous marriage and first-delivery child loss among teenage mothers.
- There is a significant association between child marriage and first-delivery child loss.
- The combined effect of consanguinity, early marriage, and teenage pregnancy is significantly associated with adverse pregnancy outcomes.

Methods

This study used secondary data from the National Family Health Survey, India, 2019–2021 (NFHS-5). NFHS-5 is a nationally representative, population-based household survey conducted under the stewardship of the Ministry of Health and Family Welfare, Government of India. The International Institute for Population Sciences (IIPS), Mumbai, served as the nodal agency for survey implementation. The survey collected information on fertility, marriage, reproductive health, maternal and child health, mortality, nutrition, and socio-demographic characteristics across India. NFHS-5 covered almost all states and Union Territories and provides nationally and sub-nationally representative estimates. The dataset is publicly available for research purposes through the DHS Program, subject to registration and approval for data access [2].

The present analysis used the NFHS-5 all-India individual women's dataset. The study population was restricted to adolescent women aged 15–19 years. For the main analysis, the analytical sample included women aged 15–19 years who had experienced at least one live birth, because the outcome of interest was child

loss following first delivery. Based on these criteria, the final national-level analytical sample comprised 5,462 adolescent women.

The study examined child loss in relation to selected marriage-related and reproductive characteristics. Child marriage was defined as first union before 18 years of age. Consanguineous marriage was defined as marriage to a blood relative, including first cousins and other blood relatives. Teenage childbirth was assessed using age at first birth, while current pregnancy status was used descriptively. As the study used anonymised, publicly available secondary data, separate ethical approval was not required for this analysis.

Measures

The dependent variable was child loss at first delivery, derived from the NFHS-5 birth history variable B5, which records whether each live-born child was alive at the time of interview. The outcome was coded as 1 if the respondent's first-born child had died by the time of interview and 0 if the first-born child was alive.

The main explanatory variables were child marriage, consanguineous marriage, and teenage childbirth. Child marriage was defined using S314C, with first union before age 18 years coded as child marriage. Consanguineous marriage was measured using S311, which records the respondent's relationship to her current husband before marriage, and was categorised as first cousin, other blood relative, or non-blood relative. Teenage childbirth was defined using V212, age at first birth, and coded as first birth before age 18 years versus age 18 years or above. Current pregnancy status was measured using V213 and used descriptively, as ongoing pregnancies do

not have a delivery outcome unless the respondent had a previous live birth. Socio-demographic covariates included age, religion, caste/social group, education or literacy, and household wealth index. Given the cross-sectional design, the variables were interpreted as factors associated with child loss rather than as causal determinants.

Data Analysis

Data were analysed using the NFHS-5 individual women's dataset. The analytical sample was restricted to adolescent women aged 15–19 years who had at least one live birth, as the outcome of interest was child loss following first delivery. Respondents with missing information on the outcome or key explanatory variables were excluded from the relevant analyses.

Descriptive statistics were used to summarise socio-demographic characteristics, marriage-related variables, age at first birth, current pregnancy status, and child-loss status. Bivariate associations between child loss and selected explanatory variables were examined using Pearson's chi-square tests. Binary logistic regression was then used to assess factors associated with child loss, as the dependent variable was dichotomous. The model included child marriage, consanguineous marriage, early teenage childbirth, and selected socio-demographic covariates. Results were reported as odds ratios with 95% confidence intervals and p-values.

Model fit was assessed using the Omnibus Test of Model Coefficients and the Hosmer–Lemeshow goodness-of-fit test. Pseudo- R^2 statistics and classification results were examined as supplementary indicators of model performance. Data were analysed using IBM SPSS Statistics version 21.

Limitation of the study

This study has some limitations. First, the analysis used cross-sectional secondary data from NFHS-5; therefore, the findings should be interpreted as associations rather than causal relationships. Second, key variables, including age at first union, age at first birth, consanguineous marriage, and child survival status, were self-reported and may be affected by recall or reporting bias. Third, the outcome was limited to child loss among live-born children and did not capture other adverse pregnancy outcomes such as miscarriage, stillbirth, induced abortion, preterm birth, low birth weight, or congenital anomalies. Fourth, the analysis could not fully account for all relevant structural and contextual factors, including quality of antenatal care, nutrition, household decision-making, access to health services, and community norms. Finally, the analytical sample was restricted to adolescent women aged 15–19 years with at least one live birth; therefore, the findings should not be generalised to all adolescent girls or all married adolescents in India.

Results

The NFHS-5 all-India women's dataset included a large national sample of women

aged 15–49 years. Among them, 231,445 women aged 15–49 years had entered first union before the age of 18 years, indicating child marriage. Within the adolescent age group of 15–19 years, 11,224 women had married before age 18. Consanguineous marriage was also reported in the dataset: 71,509 women aged 15–49 years had married a relative, while the corresponding number among women aged 15–19 years was 3,099. For the present analysis, the study sample was restricted to adolescent women aged 15–19 years who had at least one live birth, as child loss following first delivery was the main outcome of interest. This resulted in a final analytical sample of 5,462 women. Within this sample, 2,151 women had experienced both child marriage and consanguineous marriage, indicating the co-occurrence of these two marriage-related exposures among a substantial proportion of adolescent mothers.

Socio-Demographic characteristics

Univariate analysis using demographic variables are explained below. Interestingly around sixty percent of the women reported their current age as 19 years, which is followed by 18 years (28.9%), (Figure 1).

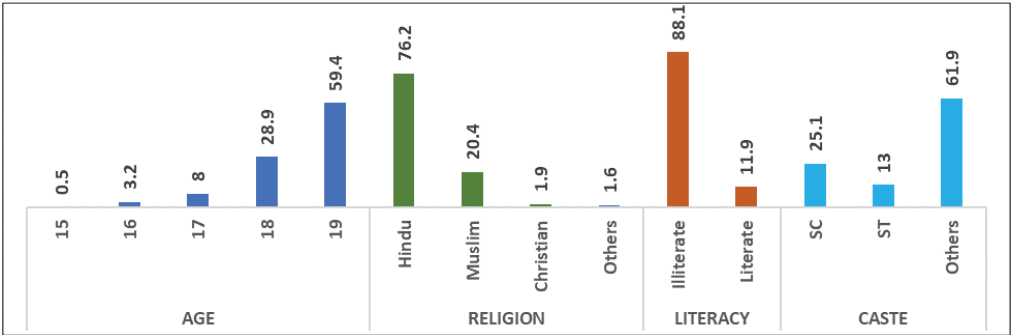


Figure 1. Distribution of demographic variables.

Consanguineous Marriage and Child Marriage and Child loss:

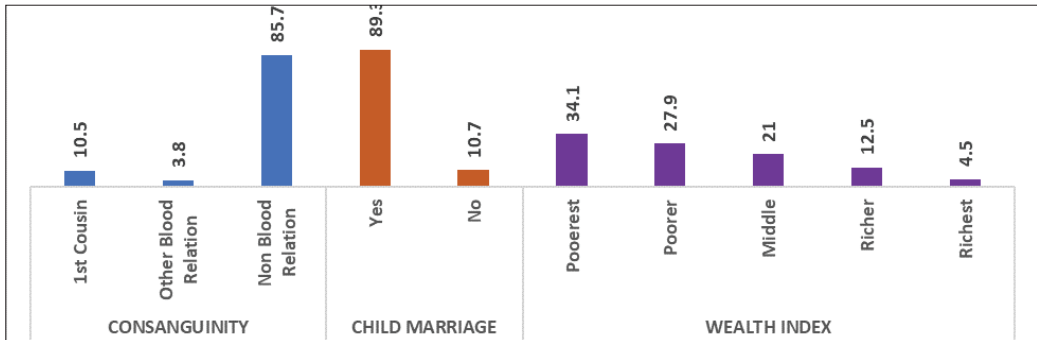


Figure 2. Distribution of marriage practice and wealth Index.

More than three-quarters of them are Hindus, followed by Muslims (20%) (Figure 1).

The majority of the women (88%) are illiterate (Figure 1) and around two-thirds of the respondents are from other caste groups, followed by Schedule Castes (25%).

Among married women, one-tenth reported marrying their first cousin and more than 85% of them married to non-blood relatives (Figure 2). Further, around nine-tenths of the women married when they were below 18 years of age (Figure 2). Consanguinity is common in South Asia, the Middle East, and North Africa. It increases the likelihood of autosomal recessive genetic disorders due to shared genes. Bittles & Black found that consanguineous marriages are associated with higher rates of stillbirth, neonatal mortality, and congenital malformations [3]. Hamamy explained that first-cousin marriages have a significant association with perinatal mortality and low birth weight [4]. Around one-third (34%) of the respondents fall into the "Poorest" Wealth Index category, followed by "Poorer" (27.9%).

When looking at the child loss, 4% of respondents reported experiencing child loss. One-third of the women are in the poorest wealth index category, followed by 28% in the poorer category, and only 5% in the richest category (Figure 2).

More than half (53%, 15407) of currently married women age 15-19 have already begun childbearing. Child marriage (marriage before age 18) is linked with early and repeated pregnancies, poor antenatal care, and greater maternal mortality. Nour reports that early marriage leads to early and repeated pregnancies, which significantly increases maternal and neonatal health risks [5]. These include higher rates of obstetric complications, stillbirth, and maternal mortality.

According to UNICEF, Girls married early are more likely to experience complications such as obstructed labor, fistula, and eclampsia [6]. Godha et al. found lower use of maternal health services and higher neonatal mortality among children born to women married before 18 years in South Asia [7]. It is observed that 18 percent of women age 15-19 (946) with no schooling have already begun childbearing, compared

with only 4 percent of women who had 12 or more years of schooling (226). Kohno et al., in their meta-synthesis of qualitative evidence, highlight that decisions about child marriage are rarely made by the girls themselves but are influenced by family pressures, economic insecurity, and community expectations [8]. Horii identifies a 'blind spot' in international human rights frameworks, where traditional practices such as child marriage are sometimes tolerated under cultural relativism [9]. This creates a tension between rights-based approaches and socio-cultural practices.

Around one-third of women experienced child marriage. Among those who married a relative, 61.5 percent married their first cousin. Teenage childbearing is higher among scheduled tribe women age 15-19 years (9%, 8311) than the other three caste/tribe groups. Northern and north-eastern states experience higher teenage pregnancy rates, including Tripura (22%, 70), West Bengal (16%, 1570), Andhra Pradesh (13%, 448), Assam (12%, 365), Bihar (11%, 1580), and Jharkhand (10%, 338) have higher levels of teenage pregnancy than other states. Among women (15-19) having combinations of consanguineous marriage, child marriage and teenage pregnancy, 19.3 % (210) percent are experiencing the first child loss (male child-11.8 (25), female child-7.5(16)). Rahman et al. in a multi-country study found that adolescent pregnancy significantly predicted poor antenatal attendance and worse delivery outcomes [10]. WHO states that teenage pregnancies are associated with anemia, preterm birth, low birth weight, and higher neonatal mortality [11-12]. Teenage mothers (aged 10-19) are biologically and socially unprepared for motherhood, leading to higher risk pregnancies. Efevbera et al. empirically demonstrate that child marriage significantly contributes to early

childhood stunting and poor developmental outcomes among children, suggesting intergenerational health impacts [13]. The report from Maharashtra shows a notable prevalence of child marriage and teenage pregnancies, especially in tribal and low-income populations, reflecting deep-rooted inequality and unmet need for reproductive health services [2].

These three factors often co-occur in vulnerable populations and amplify risks due to socioeconomic disadvantage, limited healthcare access, and poor nutrition. Santhya et al. suggest that early marriage combined with consanguinity doubles the odds of adverse pregnancy outcomes [14]. UNICEF has consistently highlighted early marriage as a harmful traditional practice, calling for stronger laws, educational empowerment of girls, and community-level behavioral change strategies [15-16]. Their advocacy efforts emphasize that ending child marriage is essential for achieving multiple Sustainable Development Goals (SDGs), especially related to health, education, and gender equality.

Results – Logistic Regression:

Logistic regression was conducted using consanguineous marriage, child marriage and demographic variables as predictors of the dependent variable child loss. The Hosmer and Lemeshow was insignificant with $\chi^2 (6, N=5462) = 10.258, p>0.05$, which indicates good model fit. A high p-value (e.g., > 0.05) suggests the model fits the data well (no significant difference between observed and expected),

Omnibus tests shows that the variables included in the model are highly significant ($\chi^2 (5, 5462) = 25.278, p<0.01$) for child loss (Table 1).

Between 0.5% and 1.8 of the variance in the dependent variable is explained by the model.

Percentage of Accuracy Classification (PAC) = 96.7% (Table 1).

The Hosmer and Lemeshow test was insignificant with $\chi^2(4,5462) = 1.894$, $p > 0.05$, which indicates a good model fit.

Table 3 shows that women who married at age 18 or above have 1.2 times higher

odds of having a living child than women who had child marriage (Table 1).

Women who married a person who is a "first cousin or other blood relative" have higher odds of child death than women who married "non-blood relatives" (Table 1).

Women who had their first birth before the age of 18 years have lower odds of having a live birth (Table 1).

Table 1. Multivariable logistic regression model of factors associated with child survival status at first delivery among adolescent mothers aged 15–19 years, NFHS-5, India

Variable	Category	Adjusted odds ratio (aOR)	95% CI	p-value
Child marriage (age at first union)	No child marriage (≥ 18 years)	Reference	—	—
	Child marriage (< 18 years)	1.24	0.76–2.01	0.391
Consanguineous marriage (relationship to husband before marriage)	First cousin	Reference	—	—
	Other blood relative	0.92	0.57–1.50	0.735
	Non-blood relative	0.35	0.21–0.58	< 0.001
Education/literacy status	Illiterate*	Reference	—	—
	Literate*	1.12	0.69–1.82	0.652
Age at first birth	≥ 18 years	Reference	—	—
	< 18 years	0.57	0.41–0.78	< 0.001

Note: aOR = adjusted odds ratio; CI = confidence interval; NFHS-5 = National Family Health Survey, India, 2019–2021. The model included child marriage, consanguineous marriage, education/literacy status and age at first birth. Model summary: Omnibus test of model coefficients, $\chi^2(5) = 25.278$, $p < 0.001$; Hosmer–Lemeshow goodness-of-fit test, $p > 0.05$; overall classification accuracy = 96.7%. Classification accuracy should be interpreted cautiously because child loss was an uncommon outcome.

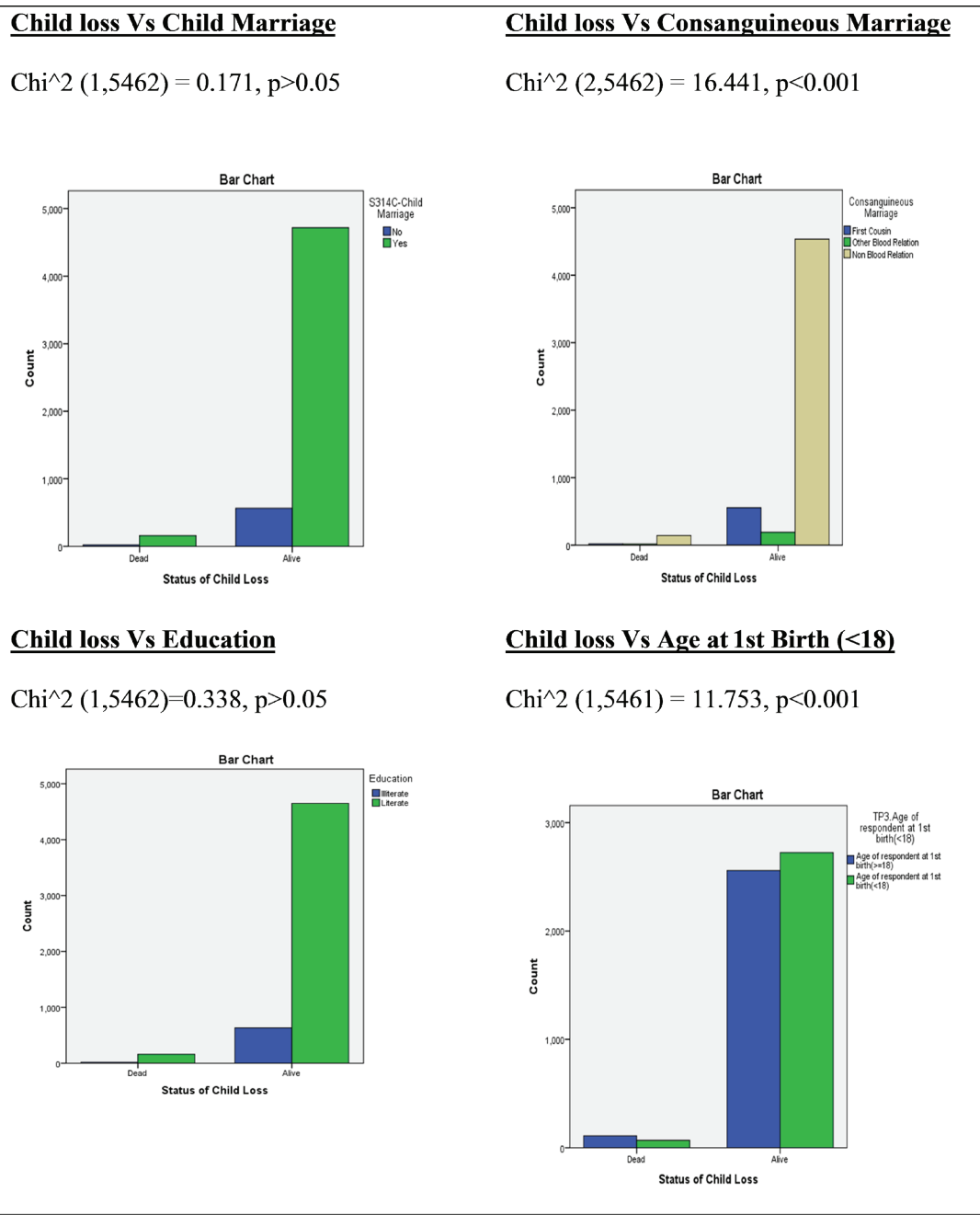


Figure 3. Chi square value (Child loss with other variables).

Discussion

This study examined how **consanguineous marriage, child marriage, and teenage pregnancy**—individually and jointly—shape the risk of **child loss at first delivery** among adolescent women in India. The findings reveal that these factors do not operate in isolation; rather, they cluster within socio-economically vulnerable populations and collectively heighten reproductive risks.

Consanguineous marriage emerged as a **significant predictor** of child loss and higher perinatal mortality. Women married to first cousins or other blood relatives had substantially higher odds of child loss compared to those married to non blood relatives. In the context of adolescent motherhood—where biological immaturity and limited healthcare access already pose challenges—these genetic risks may be further amplified.

Child marriage, although not statistically significant in the bivariate analysis, remains a **critical structural determinant** of poor reproductive outcomes. Nearly 90% of respondents were married before age 18, reflecting persistent sociocultural norms and economic pressures. Prior research shows that early marriage reduces educational attainment, accelerates sexual debut, and increases exposure to repeated pregnancies and inadequate antenatal care. The absence of a direct statistical association in this dataset may be due to the overwhelming prevalence of child marriage, which reduces variability. Nonetheless, its indirect influence is evident through its strong association with teenage pregnancy and limited maternal health service utilization.

Teenage childbirth (<18 years) was a **strong and independent predictor** of child

loss. This finding aligns with WHO and UNICEF reports that adolescent mothers face higher risks of anemia, obstructed labor, preterm birth, and neonatal mortality. Biological immaturity, combined with social vulnerability and restricted access to skilled care, contributes to these adverse outcomes. The high prevalence of teenage childbearing in this study underscores the need for targeted interventions to delay first pregnancy and improve adolescent sexual and reproductive health services.

The **combined exposure** to consanguinity, child marriage, and teenage pregnancy produced the **highest risk**, with nearly one fifth of such women experiencing child loss. This demonstrates a cumulative effect, where biological, social, and economic vulnerabilities intersect. Similar patterns have been noted by Santhya et al., who found that early marriage combined with consanguinity significantly increases adverse pregnancy outcomes. These overlapping risks are concentrated among poorer, less educated, and marginalized caste groups, highlighting the role of structural inequality.

The logistic regression model showed good fit and high classification accuracy, indicating that the predictors meaningfully explain variation in child loss, even though the variance explained is modest—typical for demographic health models influenced by multiple unmeasured factors such as nutrition, antenatal care quality, and household environment.

Overall, the findings underscore the need for **multi sectoral interventions**. Strengthening enforcement of laws against child marriage, expanding girls' education, raising awareness about the risks of consanguinity, and improving adolescent

reproductive health services are essential. Targeted efforts in high prevalence states and among marginalized communities are particularly important. Addressing these interconnected factors is crucial for reducing child loss, improving maternal and child health outcomes, and breaking the intergenerational cycle of disadvantage.

Conclusion

This study found that child loss following first delivery among adolescent mothers in India was associated with selected marriage-related and reproductive factors. Consanguineous marriage and childbirth before the age of 18 years showed important associations with child status at first delivery, while child marriage was highly prevalent and clustered with other markers of reproductive vulnerability. These findings suggest that adolescent motherhood, early union, and kinship-based marriage practices may intersect with broader socio-economic and cultural disadvantages to shape adverse child-health outcomes.

The findings underscore the need for integrated interventions that address early marriage, adolescent pregnancy, and reproductive health risks among young women. Strengthening the implementation of the Prohibition of Child Marriage Act (PCMA), 2006, together with adolescent health and empowerment programmes such as Rashtriya Kishor Swasthya Karyakram (RKSK) and the SABLA scheme, remains important for delaying marriage, supporting adolescent girls' education, and reducing early pregnancy. Programme monitoring should give particular attention to areas and communities where child marriage and early childbirth remain common, including settings where socio-

cultural practices such as early union or delayed cohabitation may influence the transition to adolescent childbearing.

Public health responses should also include culturally sensitive counselling and community awareness on the potential reproductive and child-health risks associated with consanguineous marriage, particularly where marriage between blood relatives is socially accepted. Such efforts should be framed carefully to avoid stigma and should be integrated with broader maternal, newborn and adolescent health services.

Ethical Approval and Data Governance

This study used anonymised secondary data from the National Family Health Survey, India, 2019–2021 (NFHS-5), accessed through the DHS Program following registration and approval for research use. As the analysis was based on publicly available, de-identified data, separate ethical approval was not required. No new data were collected, and no personally identifiable information was accessed. The data were used only for the stated research purpose, stored securely, and analysed in aggregate form. No attempt was made to identify individual respondents, households, or communities.

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Conflict of Interests

The author declares no conflict of interests.

Data Availability Statement

This study used secondary data from the National Family Health Survey, India, 2019–2021 (NFHS-5). The NFHS-5 dataset is publicly available for research purposes through the "DHS Program" data repository, subject to registration and approval for data access. The data can be accessed at: <https://dhsprogram.com/data/>] (<https://dhsprogram.com/data/>). The analytical dataset can be reproduced from the NFHS-5

women's recode file using the inclusion criteria and variables described in the Methods section.

Statement on the Use of Artificial Intelligence

Artificial intelligence tools were used to support language refinement and formatting of the manuscript. All analytical decisions, interpretations, and conclusions were made solely by the author. The author takes full responsibility for the accuracy and integrity of the content.

Disclaimer

The views and interpretations presented in this manuscript are those of the authors and do not necessarily reflect the views of the institutions with which they are affiliated. Any errors remain the responsibility of the author.

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