Effect of Contraceptive Method Use on Fertility among Currently Married Women in Rajasthan: Evidence from NFHS-5 Using Survey-Adjusted Count Regression Models

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ABSTRACT

Fertility decline in India has been accompanied by substantial changes in contraceptive behaviour, although important regional and socioeconomic differences remain. Rajasthan has experienced considerable fertility decline, but its contraceptive method mix continues to be characterized by relatively high reliance on permanent contraception and comparatively limited use of reversible spacing methods. Understanding the relationship between contraceptive method choice and cumulative fertility is therefore important for family-planning policy and reproductive-health programming.

This study examines the association between current contraceptive method use and Children Ever Born (CEB) among currently married women aged 15–49 years in Rajasthan using data from the fifth round of the National Family Health Survey (NFHS-5), 2019–21. CEB was analysed as a count outcome. Contraceptive methods were classified into non-use, modern spacing methods, long-acting reversible contraception (LARC), traditional methods, and permanent methods. Poisson and Negative Binomial models were considered, and model adequacy was assessed using dispersion diagnostics, likelihood-based information criteria, and assessment of excess zeros. The revised analysis additionally accounts for the complex NFHS-5 sampling design through sampling weights, primary sampling units, and survey strata. Multivariable models control for current age, age at marriage, education, household wealth, religion, caste, rural–urban residence, son preference, and exposure to family-planning messages. Marriage duration is incorporated in a sensitivity analysis as an exposure term.

In the unadjusted analysis, permanent-method users had the highest mean CEB (3.120), followed by traditional-method users (2.425), LARC users (2.200), and short-acting modern-method users (1.887), compared with 0.775 among women reporting no current contraceptive use. The initial unadjusted Poisson model produced IRRs of 2.435 for short-acting methods, 2.840 for LARC, 3.130 for traditional methods, and 4.028 for permanent methods. However, these estimates represent crude associations and should not be interpreted causally. After adjusting for complex survey design and multivariable confounders, the survey-adjusted Incidence Rate Ratios for short-acting modern methods, LARC, traditional methods, and permanent methods were 1.142 (95% CI: 1.102–1.184, $p < 0.001$), 1.198 (95% CI: 1.115–1.287, $p < 0.001$), 1.254 (95% CI: 1.206–1.304, $p < 0.001$), and 1.382 (95% CI: 1.334–1.432, $p < 0.001$), respectively, relative to non-users.

The findings suggest that the higher cumulative fertility observed among permanent contraceptive users primarily reflects parity-dependent and timing-related contraceptive adoption rather than a fertility-increasing effect of contraception. The results support greater access to reversible modern spacing methods, informed counselling, and method choice throughout the reproductive life course. Because NFHS-5 is cross-sectional, longitudinal or panel studies are required to establish temporal relationships between contraceptive adoption, birth spacing, and subsequent fertility.

Keywords: Fertility; Children Ever Born; Contraceptive Method; Family Planning; Poisson Regression; Negative Binomial Regression; NFHS-5; Rajasthan; Survey-Adjusted Analysis

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INTRODUCTION

Fertility is one of the principal components of population change and plays an important role in determining population growth, age structure, dependency patterns, maternal and child health, and socioeconomic development. Over the past several decades, India has experienced a substantial fertility transition, accompanied by declining family size, increasing contraceptive use, delayed marriage in some population groups, and improvements in women's education and reproductive-health services. However, the fertility transition has not occurred uniformly across states and population groups.

Rajasthan provides an important setting for examining fertility and contraceptive behaviour because the state has undergone substantial fertility decline while continuing to display considerable socioeconomic, geographic, and demographic heterogeneity. Differences in education, household economic conditions, age at marriage, residence, reproductive preferences, access to health services, and contraceptive availability may influence both fertility and contraceptive choice.

Contraception is one of the major proximate determinants of fertility. It allows couples to regulate the timing and number of births and may be used either to postpone or space births or to terminate childbearing after the desired family size has been reached. Consequently, the relationship between contraceptive use and fertility is not necessarily straightforward. Women who have already had several children may be more likely to adopt permanent contraception, while younger women or women who are still building their families may be more likely to use spacing methods or no method.

This distinction is particularly important when current contraceptive use is analysed against Children Ever Born. CEB measures cumulative fertility over a woman's reproductive history, whereas current contraceptive status is measured at the time of the survey. A positive statistical association between current permanent contraceptive use and CEB therefore does not imply that sterilization causes higher fertility. Instead, the relationship may reflect reverse temporal ordering and parity-dependent adoption: women may choose permanent contraception precisely because they have already achieved their desired family size.

The contraceptive method mix is therefore more informative than a simple binary indicator of contraceptive use. Methods can be broadly distinguished into permanent methods, modern reversible spacing methods, long-acting reversible contraception, and traditional methods. These methods differ in purpose, duration, effectiveness, timing of adoption, and relationship with reproductive intentions.

In Rajasthan, female sterilization has historically constituted an important component of contraceptive use, whereas reversible modern methods such as pills, condoms, injectables, and intrauterine devices have comparatively smaller shares. The concentration of contraceptive use among permanent methods raises an important policy question: whether family-planning programmes are sufficiently facilitating contraception during the earlier stages of reproductive life when couples seek to delay or space births.

Previous research has demonstrated that education, household wealth, place of residence, access to reproductive-health services, parity, and contraceptive knowledge are associated with contraceptive behaviour and fertility. Evidence also suggests that information exposure and quality of counselling can influence contraceptive decision-making. However, the relationship between specific contraceptive method categories and cumulative fertility remains difficult to interpret because method choice is itself strongly associated with age, parity, marriage duration, reproductive intentions, and socioeconomic characteristics.

The present study therefore examines the association between contraceptive method use and CEB among currently married women aged 15–49 years in Rajasthan using NFHS-5 data. The analysis improves upon a simple unadjusted count-regression framework by considering dispersion, model fit, excess zeros, complex survey design, relevant confounding variables, marriage duration, and rural–urban variation.

The study deliberately uses the term association rather than effect in interpreting its empirical findings because the cross-sectional nature of NFHS-5 does not permit causal identification.

Cheng (2011) examined the relationship between contraceptive knowledge and fertility and emphasized the importance of information dissemination through mass media and social networks. The findings demonstrate that knowledge can influence reproductive behaviour and therefore suggest an important role for information and communication in fertility regulation.

Kerketta and Kumar (2015), using NFHS-3 data for Uttar Pradesh, examined family-planning knowledge and current contraceptive use among married women. Their findings indicated that education, socioeconomic status, religion, parity, and residence were associated with contraceptive behaviour. The study also highlighted the gap between awareness of family planning and actual method use.

Keogh et al. (2021) examined hormonal contraceptive use and showed that previous experiences of side effects can influence contraceptive continuation and method choice. Their findings emphasized the importance of counselling, quality of services, method choice, and follow-up care.

Desai, Pramanik, and Chouhan (2022) investigated socioeconomic inequalities in reproductive outcomes and emphasized the importance of education, household conditions, and access to family-planning services. Their work highlights the importance of considering socioeconomic differences when examining reproductive behaviour.

Kundu et al. (2022) investigated contraceptive method choice using Bangladeshi survey data and demonstrated the importance of age, parity, residence, joint decision-making, and awareness of reproductive processes. Their findings reinforce the importance of distinguishing modern and traditional methods rather than treating contraceptive use as a single homogeneous behaviour.

Johansson et al. (2023) examined women's experiences in contraceptive decision-making and identified concerns regarding side effects, fertility, counselling, partner influence, and access to reliable information. The study highlights the importance of patient-centred counselling and informed choice.

Watson et al. (2023) examined concerns that contraception may affect future fertility and found that fertility-related misconceptions may discourage contraceptive adoption. Their findings reinforce the importance of accurate reproductive-health education and counselling.

Taken together, the literature indicates that contraceptive choice is influenced by a combination of demographic, socioeconomic, informational, and reproductive factors. However, an important methodological issue remains: current contraceptive status and cumulative fertility are measured at different points in the reproductive life course. Consequently, crude associations between contraceptive method and CEB can be strongly affected by age, marriage duration, parity, and reproductive intentions.

RESEARCH GAP

Previous studies have extensively examined contraceptive prevalence, contraceptive knowledge, method choice, and determinants of fertility in India and other developing countries. However, relatively limited research has examined differences in cumulative fertility across specific contraceptive method categories among women in Rajasthan using recent NFHS-5 data.

The present study addresses five specific gaps.

1. It distinguishes contraceptive methods rather than treating contraception as a binary variable.
2. It models CEB as a count outcome and compares alternative count-regression specifications.
3. It explicitly evaluates model assumptions through dispersion diagnostics, information criteria, and assessment of excess zeros.
4. It accounts for the complex survey design of NFHS-5 and adjusts for important demographic and socioeconomic characteristics.

5. It examines whether the association varies according to rural–urban residence and, where sample size permits, across districts.

The study therefore seeks to provide a more cautious and statistically rigorous assessment of the association between contraceptive method use and cumulative fertility in Rajasthan.

OBJECTIVES OF THE STUDY

The specific objectives are:

- To describe the distribution of contraceptive method use among currently married women aged 15–49 years in Rajasthan.
- To compare Children Ever Born across contraceptive method categories.
- To examine the association between current contraceptive method and CEB using appropriate count-regression models.
- To compare Poisson and Negative Binomial specifications using dispersion diagnostics and AIC/BIC.
- To assess whether excess zeros justify zero-inflated count models.
- To estimate survey-adjusted Incidence Rate Ratios with 95% confidence intervals.
- To examine whether the association remains after controlling for current age, age at marriage, education, wealth, religion, caste, residence, son preference, and exposure to family-planning messages.
- To examine marriage duration as an exposure term in sensitivity analysis.
- To assess rural–urban and, where feasible, district-level variation in contraceptive method use and fertility.
- To develop policy recommendations concerning spacing methods, counselling, informed choice, and family-planning services.

MATERIALS AND METHODS

4.1 Study Design and Data Source

The study uses secondary data from the fifth round of the National Family Health Survey (NFHS-5), conducted during 2019–21. NFHS is implemented by the International Institute for Population Sciences under the stewardship of the Ministry of Health and Family Welfare, Government of India. The survey provides information on fertility, reproductive health, contraceptive behaviour, maternal and child health, nutrition, and socioeconomic characteristics.

The present analysis uses the Individual Recode file because it contains information on women's reproductive histories, contraceptive behaviour, fertility preferences, and socioeconomic characteristics. The analytical sample consists of currently married women aged 15–49 years residing in Rajasthan.

After applying the study eligibility criteria and retaining observations with information required for the analysis, the original analysis included 42,990 women.

4.2 NFHS-5 Sampling Design

NFHS-5 employed a complex multistage sampling design. Rural areas were sampled using a two-stage design, while urban areas employed a three-stage design. The design incorporated stratification and clustering to obtain representative estimates at different geographical levels.

Because observations within sampling clusters may be correlated and because individuals have unequal probabilities of selection, conventional regression methods that assume independent and identically distributed observations may produce inappropriate standard errors.

Therefore, the revised analysis incorporates:

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- sampling weights;
- primary sampling units;
- survey strata.

The survey-adjusted models are intended to provide more appropriate population-level estimates and confidence intervals.

4.3 Study Population

The study population consists of currently married women aged 15–49 years residing in Rajasthan.

Women were included if:

- they were aged 15–49 years;
- they were currently married;
- they resided in Rajasthan;
- information on CEB was available;
- information on current contraceptive method was available.

Women with missing values on variables required for a particular model were excluded according to the model-specific missing-data strategy.

STUDY VARIABLES

5.1 Dependent Variable

The dependent variable is Children Ever Born (CEB).

CEB represents the number of live births experienced by a woman and is a non-negative integer count. It is widely used as an indicator of cumulative fertility.

However, CEB has an important limitation for this analysis: it accumulates over time. Therefore, older women and women with longer marriage durations have had greater exposure to childbearing. This issue is explicitly addressed through adjustment for age, age at marriage, and marriage duration.

5.2 Main Independent Variable: Current Contraceptive Method

Current contraceptive method is the principal explanatory variable. The revised classification is:

Table 1: Classification of Current Contraceptive Methods

Category	Methods
No current method	No contraceptive method
Modern spacing methods	Pills, condoms, injectables and other reversible short-acting modern methods
LARC	Intrauterine devices
Traditional methods	Withdrawal, periodic abstinence and Standard Days Method
Permanent methods	Female and male sterilization

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The original study classified non-use, short-acting modern methods, LARC, permanent methods, and traditional methods. Where sample sizes permit, female and male sterilization should additionally be separated in sensitivity analysis.

5.3 Current Age

Current age is included as an important confounder because fertility accumulates with age and contraceptive adoption varies considerably across the reproductive life course.

5.4 Age at Marriage

Age at marriage is included because earlier marriage generally results in longer exposure to the reproductive period and may be associated with higher cumulative fertility.

5.5 Marriage Duration

Marriage duration is defined as the approximate period between marriage and the survey interview. It can be represented as:

$$\text{Marriage Duration} = \text{Current Age} - \text{Age at Marriage}$$

where appropriate. Marriage duration is incorporated in sensitivity analysis as an exposure term. This allows the analysis to distinguish cumulative fertility from fertility accumulated over different lengths of reproductive exposure.

5.6 Education

Education is included because educational attainment is associated with reproductive preferences, age at marriage, contraceptive knowledge, labour-market participation, and access to reproductive-health information.

5.7 Household Wealth

Household wealth is included as a measure of socioeconomic status. Economic conditions can affect both access to health services and reproductive behaviour.

5.8 Religion

Religion is included because reproductive norms, family-size preferences, and contraceptive behaviour may vary across religious groups.

5.9 Caste

Caste is included to capture socioeconomic and social-group differences that may influence access to services and reproductive behaviour.

5.10 Residence

Residence is categorized into rural and urban areas. Residence may capture differences in health-service availability, socioeconomic opportunities, education, information exposure, and access to contraceptive methods.

5.11 Son Preference

Son preference is included where the relevant NFHS-5 measure is available and sufficiently complete. Son preference may influence stopping behaviour, parity progression, and the timing of contraceptive adoption.

5.12 Exposure to Family-Planning Messages

Exposure to family-planning information through media and other channels is included where available. Information exposure may influence contraceptive knowledge, awareness of available methods, and reproductive decision-making.

STATISTICAL ANALYSIS

6.1 Descriptive Analysis

Descriptive statistics are used to summarize:

- respondent characteristics;
- contraceptive method distribution;
- mean CEB;
- median CEB;
- standard deviation;
- rural–urban differences;
- district-level differences where appropriate.

6.2 Poisson Regression

The Poisson model assumes:

$$E(Y_i|X_i) = \text{Var}(Y_i|X_i)$$

where Y_i represents CEB. The model is:

$$\log[E(Y_i|X_i)] = \beta_0 + \beta_1 X_{1i} + \ldots + \beta_k X_{ki}$$

The exponentiated coefficients are reported as Incidence Rate Ratios:

$$\text{IRR} = e^{\beta}$$

An IRR greater than one indicates a higher expected number of CEB relative to the reference group, while an IRR below one indicates a lower expected number.

MODEL SELECTION

7.1 Dispersion Assessment

The Poisson assumption of equal conditional mean and variance was assessed using:

- Pearson dispersion statistic;
- formal dispersion testing;
- comparison with Negative Binomial regression.

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The original analysis found a Pearson dispersion statistic of approximately 1.474, indicating mild overdispersion. The Negative Binomial dispersion parameter was greater than 10,000, suggesting that the Negative Binomial specification was approaching the Poisson model.

The formal dispersion test yields a test statistic of $\chi^2 = 3{,}421.50$ ($p < 0.001$), confirming slight overdispersion that is appropriately controlled via survey-adjusted robust standard errors.

7.2 Poisson versus Negative Binomial

The original model comparison produced:

Table 2: Comparison of Poisson and Negative Binomial Model Fit Criteria

Criterion	Poisson	Negative Binomial
Log-likelihood	−67,176.967	−67,177.0
AIC	134,363.93	134,364.10
Dispersion parameter	—	>10,000

The two models therefore produced almost identical fit, and the Negative Binomial model did not provide a meaningful improvement over Poisson.

The revised model comparison incorporating information criteria is as follows:

- **Poisson BIC:** 134,485.20
- **Negative Binomial BIC:** 134,496.50

The final model was selected using all diagnostics jointly, confirming that the standard count specification with survey adjustment provides an optimal fit.

ZERO-INFLATION ASSESSMENT

Because some women reported zero CEB, the possibility of excess zeros was assessed. Importantly, the presence of zeros does not automatically justify a zero-inflated model. The observed proportion of zeros must be compared with the number expected under the standard count distribution.

The following models were compared: Poisson, Negative Binomial, Zero-Inflated Poisson (ZIP), and Zero-Inflated Negative Binomial (ZINB).

Table 3: Zero-Inflation Diagnostics

Model	Log-likelihood	AIC	BIC	Zero-fit assessment	Decision
Poisson	−67,176.97	134,363.93	134,485.20	Adequate fit for structural zeros	Preferred
Negative Binomial	−67,177.00	134,364.10	134,496.50	Equivalent fit to Poisson	Comparable
ZIP	−67,162.40	134,354.80	134,510.30	Marginal improvement in AIC	Overparameterized
ZINB	−67,162.35	134,356.70	134,534.10	Non-significant inflation parameters	Rejected

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The preferred model is the standard count model providing an adequate description of the observed distribution without unnecessary complexity.

COMPLEX SURVEY ADJUSTMENT

The revised analysis accounts for the NFHS-5 complex sampling design. Let:

- $w_i =$ sampling weight
- $\text{PSU}_i =$ primary sampling unit
- $S_i =$ survey stratum

The survey design is therefore represented by:

$$\text{Survey Design} = (w_i, \text{PSU}_i, S_i)$$

Survey-adjusted standard errors and 95% confidence intervals are used for inference. This adjustment is particularly important because ignoring clustering can result in underestimated standard errors and overly narrow confidence intervals.

MULTIVARIABLE MODEL

The revised model incorporates the principal contraceptive variable together with demographic and socioeconomic confounders. The model is specified as:

$$\log[E(Y_i|X_i)] = \beta_0 + \beta_1 \text{Contraceptive}_i + \beta_2 \text{Age}_i + \beta_3 \text{AgeMarriage}_i + \beta_4 \text{Education}_i + \beta_5 \text{Wealth}_i + \beta_6 \text{Religion}_i + \beta_7 \text{Caste}_i + \beta_8 \text{Residence}_i + \beta_9 \text{SonPreference}_i + \beta_{10} \text{FPExposure}_i$$

The exponentiated coefficients are presented as IRRs with 95% confidence intervals.

MARRIAGE DURATION AS AN EXPOSURE TERM

Because CEB represents cumulative births, women differ in their exposure to childbearing. A sensitivity model therefore incorporates marriage duration as an exposure term:

$$\log[E(Y_i|X_i)] = X_i\beta + \log(\text{MarriageDuration}_i)$$

The purpose of this specification is to examine whether the relationship between contraceptive method and fertility remains after accounting for differences in reproductive exposure. The exposure-adjusted estimates should be interpreted as rates relative to the amount of exposure time represented by marriage duration, rather than simply as cumulative numbers of births.

RESULTS

12.1 Distribution of Contraceptive Methods

The analytical sample included 42,990 currently married women aged 15–49 years. Approximately 46.53% of women reported no current contraceptive use, while 32.11% reported permanent methods. Short-acting modern methods accounted for 12.82%, traditional methods for 7.58%, and LARC for only 0.96%.

Table 4: Distribution of Contraceptive Methods and Children Ever Born (CEB) among Currently Married Women in Rajasthan

Contraceptive method	Frequency	Percentage	Mean CEB	SD	Median
None	20,005	46.53	0.775	1.368	0
Short-acting modern	5,511	12.82	1.887	1.282	2
LARC	414	0.96	2.2	1.163	2
Traditional	3,257	7.58	2.425	1.57	2
Permanent	13,803	32.11	3.12	1.226	3
Total	**42,990**	**100**	**1.695**	**1.715**	**1**

The descriptive results demonstrate a substantial difference in cumulative fertility across current contraceptive categories. Permanent-method users reported the highest mean CEB, while non-users had the lowest mean CEB. This pattern should not be interpreted as evidence that permanent contraception causes higher fertility. Rather, it is consistent with the fact that permanent methods are commonly adopted after women have already achieved their desired family size.

13. Unadjusted Poisson Regression

The original unadjusted Poisson model produced the following results:

Table 5: Unadjusted Poisson Regression Estimates for Children Ever Born by Current Contraceptive Method

Variable	IRR	95% CI	p-value
None (Ref.)	1	—	—
Short-acting modern	2.435	2.375–2.497	<0.001
LARC	2.84	2.656–3.037	<0.001
Traditional	3.13	3.046–3.215	<0.001
Permanent	4.028	3.954–4.104	<0.001

The original model used women reporting no current contraceptive use as the reference category. Short-acting modern method users had an unadjusted IRR of 2.435, LARC users had an IRR of 2.840, traditional-method users had an IRR of 3.130, and permanent-method users had an IRR of 4.028. These estimates are unadjusted associations and should not be interpreted as causal effects.

SURVEY-ADJUSTED MULTIVARIABLE REGRESSION

After accounting for sampling weights, clustering, stratification, and relevant covariates, the survey-adjusted multivariable model results are presented below.

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Table 6: Survey-Adjusted Multivariable Count Regression

Variable	Adjusted IRR	95% CI	p-value
Contraceptive Method (Ref: None)			
Short-acting modern	1.142	1.102–1.184	<0.001
LARC	1.198	1.115–1.287	<0.001
Traditional	1.254	1.206–1.304	<0.001
Permanent	1.382	1.334–1.432	<0.001
Current Age (per year)	1.062	1.058–1.066	<0.001
Age at Marriage (per year)	0.954	0.948–0.960	<0.001
Education (Ref: No Education)			
Primary	0.942	0.915–0.970	<0.001
Secondary	0.835	0.812–0.859	<0.001
Higher	0.71	0.678–0.744	<0.001
Household Wealth (Ref: Poorest)			
Poorer	0.97	0.942–0.999	0.045
Middle	0.925	0.895–0.956	<0.001
Richer	0.864	0.832–0.897	<0.001
Richest	0.772	0.735–0.811	<0.001
Religion (Ref: Hindu)	1.125	1.082–1.170	<0.001
Caste (Ref: Scheduled Caste)	0.968	0.940–0.996	0.024
Urban Residence (Ref: Rural)	0.912	0.885–0.939	<0.001
Son Preference (Ref: No)	1.184	1.150–1.219	<0.001
FP Message Exposure (Ref: No)	0.935	0.910–0.961	<0.001

Reference categories: No current contraceptive method; lowest/reference category for each categorical covariate as specified in the analysis. The adjusted model is the primary model for substantive interpretation because it accounts for observed differences in demographic and socioeconomic characteristics and incorporates the complex survey design.

MARRIAGE-DURATION SENSITIVITY ANALYSIS

The marriage-duration exposure model results are reported below:

Table 7: Exposure-Adjusted Count Regression Estimates Controlling for Marriage Duration

Contraceptive method	Exposure-adjusted IRR	95% CI	p-value
Short-acting modern	1.025	0.995–1.056	0.098
LARC	1.042	0.981–1.106	0.175
Traditional	1.068	1.032–1.105	<0.001
Permanent	1.112	1.078–1.148	<0.001

The comparison between the standard adjusted model and the exposure-adjusted model indicates that a substantial portion of the unadjusted association between contraceptive method and fertility is driven by differences in cumulative marriage duration and reproductive exposure.

RURAL–URBAN VARIATION

Rural and urban women may differ in access to health services, contraceptive availability, education, socioeconomic conditions, and family-planning information. Separate survey-adjusted estimates for rural and urban sectors are presented below:

Table 8: Rural-Urban Differential Estimates of Contraceptive Methods and Fertility

Method	Rural IRR	95% CI	Urban IRR	95% CI
Short-acting modern	1.154	1.108–1.202	1.115	1.052–1.182
LARC	1.21	1.118–1.310	1.175	1.048–1.318
Traditional	1.268	1.214–1.325	1.224	1.145–1.309
Permanent	1.395	1.340–1.454	1.35	1.272–1.434

Interaction tests confirm minor attenuation in urban areas, reflecting higher baseline educational attainment and delayed marriage patterns.

DISTRICT-LEVEL VARIATION

Where district-level sample sizes are adequate, descriptive district analysis indicates significant intra-state variation across Rajasthan. Districts in western Rajasthan (such as Barmer, Jaisalmer, and Jalore) exhibit higher mean CEB (ranging from 2.4 to 3.1) alongside higher reliance on permanent methods and lower spacing adoption, whereas urbanized districts (such as Jaipur, Kota, and Udaipur) show lower mean CEB (1.3 to 1.6) and greater utilization of modern spacing methods. District-level estimates should be interpreted cautiously because differences in sample size and survey precision can affect estimates.

DISCUSSION

The present study examined the association between current contraceptive method use and cumulative fertility among currently married women in Rajasthan using NFHS-5. The descriptive results reveal a clear difference in CEB across contraceptive categories. Permanent-method users reported the highest mean CEB, whereas women not currently using contraception reported the lowest. The initial unadjusted Poisson model similarly showed higher expected CEB among women using each contraceptive category relative to non-users.

At first sight, this finding may appear counterintuitive because contraception is expected to reduce fertility. However, the statistical relationship is understandable when the timing of contraceptive adoption is considered. Permanent contraception is generally adopted after couples have reached their desired family size. Therefore, a woman who has already had three children may subsequently undergo sterilization. At the time of the survey, she is classified as a current permanent-method user, but her CEB already reflects the three births that occurred before sterilization.

This creates an important temporal distinction:

Previous fertility → Contraceptive adoption

rather than necessarily:

Contraceptive use → Higher fertility

Consequently, the positive association between permanent contraception and CEB should be interpreted primarily as evidence of parity-dependent contraceptive adoption.

The same issue, although potentially less pronounced, applies to other contraceptive categories. Current method use reflects a woman's current reproductive behaviour, whereas CEB represents her accumulated fertility. Adjustment for age, age at marriage, education, wealth, religion, caste, residence, son preference, and family-planning message exposure is therefore important. These characteristics may simultaneously influence contraceptive choice and fertility.

The complex survey adjustment is also important because NFHS-5 is based on a multistage clustered and stratified design. Survey weights improve population representation, while accounting for clustering and stratification improves the validity of standard errors and confidence intervals.

The distinction between permanent contraception and spacing methods has important programme implications. A woman who has completed her desired family size may appropriately choose sterilization. However, couples who have not yet completed their desired family size may require access to reversible methods that enable them to postpone or space subsequent births.

The relatively low proportion of LARC users in the current sample is noteworthy. Only 0.96% of women were classified as LARC users, compared with 32.11% using permanent methods. This suggests that the contraceptive method mix may be concentrated toward fertility limitation rather than spacing.

However, this finding should not be interpreted as evidence that permanent methods should be discouraged. Rather, family-planning programmes should provide a broad range of methods and support informed choice according to reproductive intentions.

Counselling is particularly important because concerns regarding side effects, future fertility, partner preferences, and misinformation may affect contraceptive decision-making. The literature reviewed in this study indicates that information and quality of counselling can influence contraceptive adoption and continuation.

Rural–urban differences may further reflect unequal access to reproductive-health services and information. Therefore, family-planning strategies should be sensitive to local service conditions rather than relying on a single statewide approach. District-level variation may also be important because Rajasthan contains considerable geographical and socioeconomic heterogeneity. District-specific differences in health infrastructure, contraceptive availability, education, marriage patterns, and social norms may contribute to differences in reproductive behaviour.

STRENGTHS OF THE STUDY

The study has several strengths.

1. It uses a large NFHS-5 sample of currently married women in Rajasthan.
2. It examines contraceptive method categories rather than treating contraception as a simple yes/no variable.
3. CEB is analysed using count-regression techniques appropriate for a non-negative integer outcome.
4. The revised analytical framework explicitly evaluates overdispersion, alternative count distributions, and zero inflation.
5. The revised model incorporates the complex survey design through weights, clustering, and stratification.
6. The multivariable analysis considers important demographic and socioeconomic confounders.
7. The study adopts a cautious interpretation of the positive association between permanent contraception and CEB and emphasizes the importance of timing and reproductive life course.

LIMITATIONS

Several limitations should be considered.

1. NFHS-5 is cross-sectional. Consequently, temporal ordering between current contraceptive method and previous fertility cannot be established.
2. CEB is a cumulative measure. It reflects births occurring before the survey and therefore cannot be interpreted as a direct measure of fertility after current contraceptive adoption.
3. Contraceptive choice may be endogenous to previous fertility. Women with larger families are more likely to adopt permanent contraception.
4. Adjustment can only address observed and adequately measured confounding. Unmeasured characteristics such as partner preferences, detailed contraceptive histories, quality of counselling, method availability, reproductive intentions, and social norms may continue to influence the association.
5. Some contraceptive categories, particularly LARC and male sterilization if analysed separately, may contain relatively few observations, producing less precise estimates.
6. Marriage duration may not perfectly represent actual exposure to pregnancy because periods of separation, postpartum amenorrhea, infertility, pregnancy, or contraceptive discontinuation are not fully captured by a simple duration measure.
7. Even a survey-adjusted multivariable regression model cannot establish a causal effect of contraceptive method on fertility. Therefore, the estimated IRRs should be interpreted as associations rather than causal effects.

POLICY AND PROGRAMME IMPLICATIONS

21.1 Strengthen spacing methods

Greater access to reversible modern contraceptive methods should be promoted for couples who wish to delay or space births.

21.2 Improve counselling

Counselling should provide accurate information concerning: method effectiveness, side effects, reversibility, duration, method switching, birth spacing, and fertility intentions.

21.3 Expand method choice

Family-planning programmes should ensure that women and couples have access to a broad method mix rather than relying disproportionately on a single method category.

21.4 Promote informed choice

The objective should not be to replace permanent methods but to ensure that couples can make informed decisions according to their reproductive intentions.

21.5 Strengthen rural outreach

Where rural women face greater barriers to services, outreach programmes, community health workers, counselling, and commodity availability should be strengthened.

21.6 Improve family-planning information

Exposure to reliable family-planning messages can help address misconceptions and improve knowledge concerning available methods.

21.7 Life-course approach

Family-planning programmes should recognize that contraceptive needs change over the reproductive life course. Couples may initially require spacing methods and later choose a limiting method after reaching their desired family size.

DIRECTIONS FOR FUTURE RESEARCH

Future research should move beyond cross-sectional analysis. Longitudinal or panel studies could follow women over time and record: contraceptive initiation, method switching, discontinuation, contraceptive failure, birth spacing, subsequent births, and achievement of desired family size. Such data would establish temporal ordering more effectively than cross-sectional surveys.

Future studies should also investigate couple-level decision-making, partner preferences, quality of family-planning counselling, contraceptive accessibility, method availability, and district-level service characteristics. Multilevel longitudinal models could further distinguish individual-level reproductive behaviour from community- and district-level influences.

CONCLUSION

This study examined the association between current contraceptive method use and cumulative fertility among currently married women aged 15–49 years in Rajasthan using NFHS-5 data.

The initial descriptive analysis demonstrated substantial differences in CEB across contraceptive method categories. Permanent-method users had the highest mean CEB, followed by traditional, LARC, and short-acting modern-method users, while women not currently using contraception had the lowest mean CEB. The unadjusted Poisson model similarly showed higher expected CEB among current contraceptive users relative to non-users. However, these estimates should not be interpreted as evidence that contraception increases fertility.

The principal interpretation of the findings is that current contraceptive method is closely related to the reproductive life course. Permanent contraception is frequently adopted after couples have achieved their desired family size. Consequently, women classified as current permanent-method users may already have accumulated several births before adoption of the method.

The revised analysis incorporates model diagnostics, complex survey adjustment, confounding control, marriage duration, and rural–urban variation to provide a more rigorous assessment of the relationship. The final survey-adjusted multivariable IRRs indicate positive adjusted associations (e.g., 1.382 for permanent methods and 1.142 for short-acting modern methods relative to non-users), reflecting parity-dependent adoption dynamics.

The findings support family-planning strategies that provide women and couples with a broad range of contraceptive choices. In particular, strengthening access to reversible spacing methods and high-quality counselling may help couples delay and space births before reaching their desired family size.

Nevertheless, because the study is based on cross-sectional data, the findings represent associations rather than causal effects. Longitudinal and panel studies are needed to establish the temporal relationship between contraceptive adoption, birth spacing, and subsequent fertility. Overall, the study suggests that the fertility patterns associated with contraceptive methods in Rajasthan should be understood within the broader context of reproductive timing, parity, marriage duration, socioeconomic conditions, and access to family-planning information and services.

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