

Changing Trends and Determinants of Hysterectomy among Reproductive-Aged Women in India: A Comparative Analysis of NFHS-4 and NFHS-5 Data

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ABSTRACT

Hysterectomy, the surgical removal of the uterus, is one of the most common gynecological procedures performed worldwide, yet its prevalence and determinants vary significantly across contexts. In India, concerns about the rising rates of hysterectomy, particularly among women of reproductive age, necessitate a comprehensive understanding of its patterns and determinants. This study investigates the prevalence, regional disparities, and socio-demographic predictors of hysterectomy among women aged 15–49 years in India, using nationally representative data from two rounds of the National Family Health Survey (NFHS-4, 2015–16, and NFHS-5, 2019–21).

Data from nearly 1.4 million women across both survey rounds were analyzed. Prevalence estimates showed a marginal national increase from 3.2% in NFHS-4 to 3.3% in NFHS-5, though stark regional variations persisted. Southern states such as Andhra Pradesh (8.9% to 8.7%) and Telangana (7.7% to 8.2%) recorded the highest prevalence, while northeastern states reported rates below 2%. Logistic regression analysis revealed strong associations between hysterectomy and socio-demographic characteristics. Age emerged as the most significant predictor: women aged 40–49 years had over 15 times higher odds compared to women aged 15–29. Rural residence, lower educational attainment, multiparity, and higher body mass index were also positively associated with hysterectomy. Conversely, higher education and anemia were protective factors. Women with non-communicable diseases had significantly higher odds of undergoing hysterectomy, and the majority of procedures were conducted in private facilities (nearly 70% in both rounds), underscoring the dominance of the private sector in surgical care.

These findings highlight the interplay of health, social, and economic factors in shaping hysterectomy patterns in India. The persistent regional disparities and reliance on private healthcare call for stricter clinical oversight, expansion of non-surgical alternatives, and greater public awareness to prevent unnecessary procedures. Strengthening reproductive healthcare infrastructure and policy safeguards is crucial to ensuring equitable, evidence-based care for Indian women.

Keywords: Hysterectomy, NFHS, reproductive health, India, socio-demographic determinants, regional disparities.

Introduction

Hysterectomy, the surgical removal of the uterus, is commonly performed to treat uterine conditions such as fibroids, cysts, and uterine prolapse, which often affect women close to or after menopause (Hammer A. et al., 2015). The prevalence of hysterectomy varies significantly between developed and developing countries owing to differences in healthcare access, medical practices, sociocultural factors, and disease burden.

In developed countries, hysterectomy prevalence is generally higher owing to better access to healthcare facilities, advanced diagnostic techniques, and a higher incidence of conditions requiring surgical intervention (e.g., fibroids, endometriosis, and cancers). In these countries, hysterectomy is often performed electively for benign conditions and is supported by comprehensive insurance and health care systems. For example, a study conducted in the United States (Sameer, V. Gopalani et al., 2024) reported hysterectomy prevalence among women aged ≥ 30 years at 27.3% in 2000 and 25.1% in 2020. Similarly, research in Australia found that approximately 22% of women aged 50–69 years underwent hysterectomy (Hill et al., 2021).

Conversely, developing countries report a lower hysterectomy prevalence, often due to limited access to surgical care and financial constraints. In these settings, hysterectomies are usually performed for life-threatening conditions such as uterine prolapse or advanced-stage cancers. The prevalence of hysterectomy varies significantly across developing countries, with India showing rates between 3.2% and 11.35% among women of reproductive age (Dejalin Rout et al., 2023; Angad Singh & D. Govil, 2021; C. Shekhar et al., 2019). Prevalence is higher in rural areas and among older, less educated, and affluent women (C. Shekhar et al., 2019). Hysterectomy is associated with various non-communicable diseases and socio-demographic factors (Dejalin Rout et al., 2023; Angad Singh & D. Govil, 2021).

Recent studies have examined the prevalence and determinants of hysterectomy among women aged 15-49 in India, using data from the National Family Health Survey (NFHS). The overall

prevalence of hysterectomy in India was found to be 3.2-3.3% (Kumari&Kundu, 2022; Singh &Govil, 2021), with significant regional variations.

Thus, this study aims to examine the prevalence of hysterectomy among women in India from 2015-16 to 2019-21, with additional analyses of the associations of factors such as maternal socio-demographics, health behaviors, on overall hysterectomies in India.

The Specific Objectives of the study are as follows:

1. Trends in the prevalence of hysterectomy among women aged 15–49 years in India.
2. Explore regional variations in hysterectomy prevalence across Indian states.
3. The socioeconomic and demographic profiles of women who underwent hysterectomy were analyzed.
4. Identifying predictors and underlying determinants of hysterectomy.

Data and Methods

Data

Data for this have been extracted from two successive rounds of the National Family Health Surveys (NFHS-4 and NFHS-5) to examine trends in the prevalence of hysterectomy among women aged 15–49 years in India and explore regional variations across Indian states. NFHS was conducted by the International Institute for Population Sciences (IIPS) under the sponsorship of the Ministry of Health and Family Welfare (MoHFW), Government of India. Both rounds of the NFHS provide comprehensive information on the population, nutrition, and health of India, its states/UTs, and districts.

In the NFHS-4 (2015–16), and NFHS-5 (2019–21), comprehensive household data were collected. Both rounds utilized Computer-Assisted Personal Interviewing (CAPI) devices with pre-installed structured questionnaires to collect data.

For the NFHS-4, 723,875 eligible women aged 15–49 years were identified in the interviewed households. Of these, 699,686 participated in the survey, resulting in a response rate of 97%.

Similarly, in the NFHS-5 (2019–21), 28,843 PSUs were selected, and fieldwork was completed in 28,809 clusters. The data were collected from 636,699 households, achieving a response rate of 99%. Of these, 724115 women participated in the survey, with a response rate of 98%.

Variables description

Outcome variable

The prevalence of hysterectomy among women aged 15–49 years was identified using specific questions included in the women’s questionnaire during both NFHS rounds.

- The first relevant question was: **“When did your last menstrual period start?”** Among the response options, one was: **“Has had hysterectomy.”**
- The second direct question was, **“Some women underwent an operation to remove the uterus. Have you undergone such an operation?”** Women who answered "yes" were categorized as having undergone hysterectomy, while the others were placed in the non-hysterectomy group.

Explanatory variable

Based on previous studies (Meher&Sahoo, 2019; Singh et al., 2020; Shekhar et al., 2019; Liu et al., 2017; Shen et al., 2023; Chen et al., 2024; Fitzgerald et al., 2019), the regional variation, socioeconomic, and demographic characteristics of the women included in the sample were analyzed. Specifically, the following variables were considered.

- **Respondents age:** 15–29, 30–39, and 40–49 years.
- **Place of Residence:** Rural and Urban.
- **Education Level:** No education, Primary, Secondary, and Higher.
- **Caste:** Scheduled Caste/Scheduled Tribe (SC/ST), Other Backward Classes (OBC), and others.
- **Religion:** Hindu, Muslim, Christian, and Others.
- **Wealth Index:** Poorest, Poor, Middle, and Rich.
- **Marital Status:** Never married, married/living with partner, or widowed/divorced/separated.
- **Health insurance:** Yes and No.
- **Total Number of Children:** Nulliparous, Uniparous, and Multiparous.
- **Had Sterilization:** Yes and No.
- **Terminated pregnancy:** Yes and No.
- **Had Anaemia:** Yes and no.
- **Non-Communicable Diseases (NCDs):** Yes and No.
- **Body Mass Index (BMI):** Categorized as
 - Too thin for their height (BMI < 18.5 kg/m²),
 - Normal (BMI 18.5–24.9 kg/m²),

- Overweight (BMI 25–29.9 kg/m²), and
- Obesity (BMI ≥ 30 kg/m²).
- **Anemia Levels:** Severe, Moderate, Mild, and Not Anemic.

These variables were analyzed using data from the NFHS-4 and NFHS-5.

Statistical analysis

Descriptive statistics along with bivariate analysis were used to find out the results. Bivariate analysis was conducted to examine the association between women’s background characteristics and hysterectomy. The Multivariable logistic regression was used when the dependent variable is categorical (Harris, 2021). In our study, the dependent variable ever undergone hysterectomy has two categories; Yes and No. The objective of our study is to understand the factors that motivate people to undergo hysterectomy. Thus, the multivariable logistic regression would be appropriate here for our analysis. The interpretation of the regression model is done through the odds ratio (OR), where OR>1 implies higher likelihood of getting hysterectomy, and OR<1 lower likelihood (Harris, 2021; Kothari, 2004).

Results

Prevalence of Hysterectomy	NFHS 4	NFHS 5
India	3.2	3.3
North		
Chandigarh	1.5	0.9
Delhi	1.1	1.7
Haryana	1.9	2.4
Himachal Pradesh	2.2	2
Jammu & Kashmir	2.6	2.7
Ladakh	na	3.6
Punjab	2.6	3.2
Rajasthan	2.3	2.1
Uttarakhand	2	2.1
Central		

Chhattisgarh	1.9	1.7
Madhya Pradesh	3	2.8
Uttar Pradesh	2.2	2.6
East		
Bihar	5.4	6
Jharkhand	2.3	2.6
Odisha	2.1	1.9
West Bengal	2	2.7
Northeast		
Arunachal Pradesh	1.8	1.9
Assam	0.9	1.1
Manipur	1.6	1.8
Meghalaya	1.1	0.7
Mizoram	1	1.5
Nagaland	1.6	1.8
Sikkim	1.3	0.8
Tripura	1.3	1.7
West		
Dadra & Nagar Haveli	3.6	1.9
Daman & Diu	3	
Goa	2.6	1.9
Gujarat	4.2	3.9
Maharashtra	2.6	3
South		
Andaman & Nicobar Islands	1.8	2
Andhra Pradesh	8.9	8.7
Karnataka	3	3.4
Kerala	1.8	2

Lakshadweep	0.9	1.2
Puducherry	1.7	1.6
Tamil Nadu	3.4	2.4
Telangana	7.7	8.2

Table 1 revealed the prevalence of hysterectomy across Indian states and union territories based on NFHS-4 and NFHS-5. According to the National Family Health Surveys (NFHS-4 and NFHS-5), the prevalence of hysterectomy among women aged 15–49 in India has marginally increased from 3.2% in NFHS-4 to 3.3% in NFHS-5. However, significant regional and state-level variations highlight disparities in healthcare practices and access across the country. In the southern region, hysterectomy prevalence remains the highest. Andhra Pradesh reported the highest rates in both rounds, with 8.9% in NFHS-4 and a slightly reduced 8.7% in NFHS-5, followed by Telangana, which saw an increase from 7.7% to 8.2%. Karnataka also showed a rise from 3.0% to 3.4%, while Tamil Nadu recorded a noticeable decline from 3.4% to 2.4%, indicating some regional variation within the South. In contrast, the northern region generally exhibited lower prevalence. For example, Delhi saw an increase from 1.1% to 1.7%, Haryana from 1.9% to 2.4%, and Punjab from 2.6% to 3.2%, while Chandigarh recorded a decline from 1.5% to 0.9%.

The central region showed moderate prevalence, with Madhya Pradesh decreasing slightly from 3.0% to 2.8%, and Uttar Pradesh increasing from 2.2% to 2.6%. Chhattisgarh, however, experienced a slight decline from 1.9% to 1.7%. The eastern region presents mixed trends; Bihar stands out with a consistently high and increasing prevalence from 5.4% to 6.0%, while West Bengal rose from 2.0% to 2.7%, and Odisha showed a minor decline from 2.1% to 1.9%. In the northeastern region, prevalence remains among the lowest in the country, with most states reporting below 2%. For instance, Assam increased slightly from 0.9% to 1.1%, while Meghalaya declined from 1.1% to 0.7%, and Sikkim from 1.3% to 0.8%.

In the western region, Gujarat showed high prevalence, slightly declining from 4.2% to 3.9%, while Maharashtra increased from 2.6% to 3.0%. Union Territories such as Dadra & Nagar Haveli and Goa showed notable declines, from 3.6% to 1.9% and 2.6% to 1.9%, respectively. Overall, the data reflect persistent regional disparities, with southern and eastern states like Andhra Pradesh, Telangana, and Bihar reporting consistently higher hysterectomy rates, possibly due to differences in healthcare access, quality of reproductive health services, and socio-economic factors. Conversely, northeastern and some northern states maintain relatively low prevalence, suggesting variations in medical practice, awareness, and availability of alternatives to surgical intervention. These differences underscore the need for targeted public health

strategies to ensure evidence-based, equitable reproductive healthcare across regions. (put it in summary with reference).

Figure 1 State-wise prevalence of Hysterectomy among women 15-49 years NFHS-4 vs NFHS 5

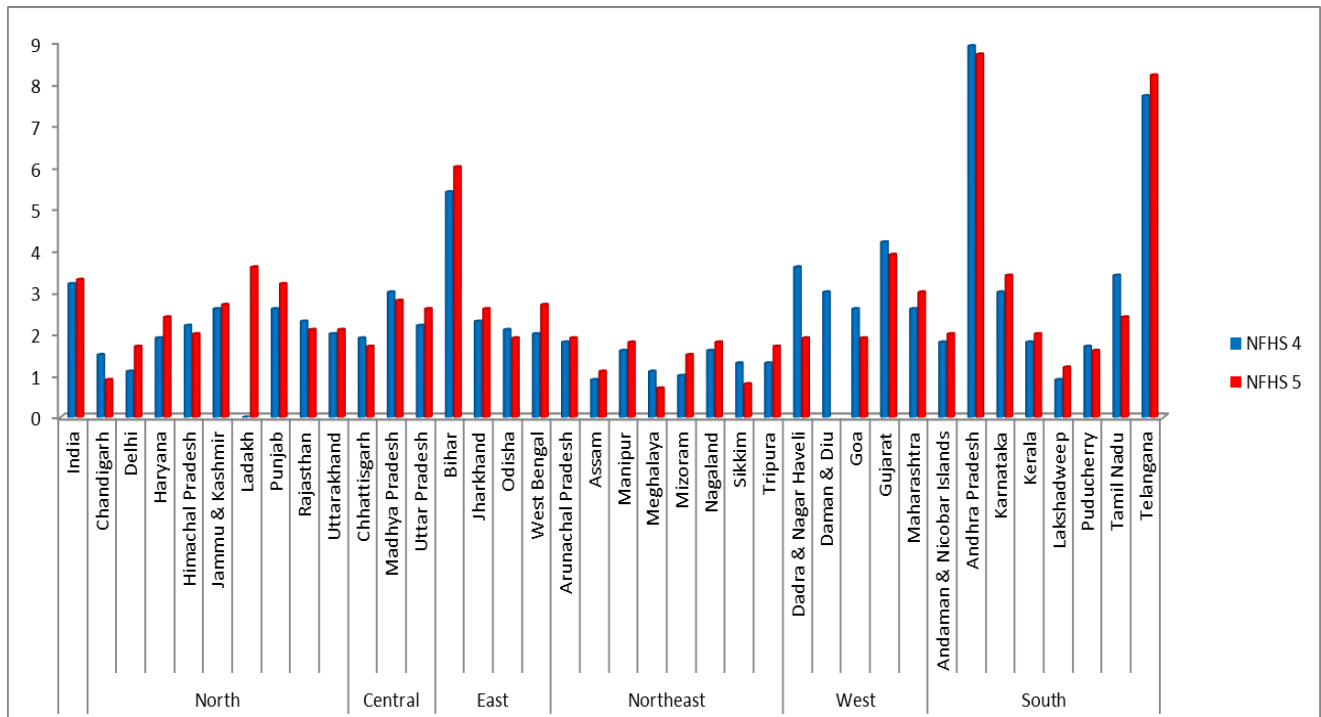


Table 2: Descriptive statistics of study population.

Characteristics	Category	NFHS 4		NFHS 5	
		Frequency	Percent	Frequency	Percent
Age of the respondent	15-29	359560	51.4	359128	49.6
	30-39	187659	26.8	197936	27.3
	40-49	152467	21.8	167051	23.1
	Total	699686	100	724115	100
Place of Residence	Urban	242225	34.6	235279	32.5
	Rural	457461	65.4	488836	67.5

	Total	699686	100	724115	100
Religion	Hindu	563739	80.6	589164	81.4
	Muslim	96461	13.8	97595	13.5
	Christian	16620	2.4	16995	2.3
	Other	22866	3.3	20361	2.8
	Total	699686	100	724115	100
Caste	SC/ST	206763	30.7	225746	32.7
	OBC	303837	45.2	310783	45.1
	others	162266	24.1	153030	22.2
	Total	672866	100	689559	100
Respondents Educational Status	No education	192135	27.5	162451	22.4
	Primary	87233	12.5	84922	11.7
	Secondary	331037	47.3	363396	50.2
	Higher	89281	12.8	113346	15.7
	Total	699686	100	724115	100
Current Marital status	never married	159035	22.7	172075	23.8
	Married/Living with partner	511373	73.1	521352	72
	Widowed/Divorced/separated	29279	4.2	30688	4.2
	Total	699686	100	724115	100
Wealth Index	Poor	260954	37.3	278786	38.5
	Middle	143814	20.6	148616	20.5
	Rich	294917	42.1	296712	41
	Total	699686	100	724115	100
Having Health Insurance	No	557234	79.6	508601	70.2
	Yes	142452	20.4	215514	29.8
	Total	699686	100	724115	100

Total no of children	nulliparous	213078	30.5	223106	30.8
	uniparous	99101	14.2	103185	14.2
	multiparous	387507	55.4	397824	54.9
	Total	699686	100	724115	100
Had sterilized or not	No	504860	72.2	513784	71
	Yes	194826	27.8	210331	29
	Total	699686	100	724115	100
Have terminated pregnancy	No	615867	88	635791	87.8
	Yes	83819	12	88324	12.2
	Total	699686	100	724115	100
Had anemia	no	318755	46.9	293056	43
	had anemia	360690	53.1	388977	57
	Total	679445	100	682033	100
BMI	<18.5	154031	22.5	127823	18.4
	18.5-24.99	389501	57	399109	57.6
	>=25	140043	20.5	166128	24
	Total	683575	100	693060	100
Had NCD	No	617242	88.2	674227	93.1
	Yes	82444	11.8	49888	6.9
	Total	699686	100	724115	100
Place where hysterectomy performed	Govt.	7125	32.3	7085	30
	Pvt.	14852	67.3	16444	69.6
	Others	76	0.3	87	0.4
	Total	22053	100	23616	100
Hysterectomy	No	677633	96.8	700499	96.7
	Yes	22053	3.2	23616	3.3
	Total	699686	100	724115	100

Source: Authors' calculations from NFHS-5 and NFHS-4

CI: Confidence Interval

SC: Scheduled Caste
ST: Scheduled Tribe
OBC: Other backward Castes

Based on the descriptive statistics from NFHS-4 and NFHS-5, the study population includes women aged 15–49, with a near-complete response rate in both rounds (699,686 in NFHS-4 and 724,115 in NFHS-5). The age distribution remained fairly stable, with the largest share of women aged 15–29 (51.4% in NFHS-4, slightly decreasing to 49.6% in NFHS-5), followed by those aged 30–39 and 40–49. Rural women comprised a higher proportion in both rounds, increasing slightly from 65.4% to 67.5%. Regarding religion, the majority were Hindu (80.6% to 81.4%), followed by Muslims and Christians. Caste-wise, SC/ST representation increased (30.7% to 32.7%), while the share of "Other" castes declined.

Educational attainment improved across the board: the percentage of women with no education declined from 27.5% to 22.4%, and those with higher education increased from 12.8% to 15.7%. In terms of marital status, over 70% were married or living with a partner in both rounds. The wealth index distribution showed slight increases in the poor category (37.3% to 38.5%), with minor changes in the middle and rich categories. Health insurance coverage rose significantly from 20.4% in NFHS-4 to 29.8% in NFHS-5, indicating improved access to financial protection for health.

Reproductive health indicators show that multiparous women made up the majority in both rounds (~55%), and the proportion of sterilized women increased from 27.8% to 29%. The share of women reporting terminated pregnancies remained stable at around 12%. Anemia prevalence increased notably from 53.1% to 57%, suggesting a worsening trend in nutritional health. In terms of BMI, there was a shift from underweight (<18.5) women (declining from 22.5% to 18.4%) to those overweight or obese (≥ 25), increasing from 20.5% to 24%.

Interestingly, the prevalence of non-communicable diseases (NCDs) dropped from 11.8% to 6.9%, possibly reflecting either improved prevention or underreporting. Regarding hysterectomy, the overall prevalence rose slightly from 3.2% to 3.3%. Notably, the majority of procedures were performed in private facilities (67.3% in NFHS-4 and 69.6% in NFHS-5), highlighting a continued reliance on private healthcare for major gynecological surgeries. This comprehensive profile underscores ongoing challenges and progress in women's health and socio-economic conditions across both survey rounds.

Table 3: Prevalence of Hysterectomy by background characteristics in India

Characteristics	Category	NFHS 4		NFHS 5	
		Frequency(n)	Percentage	Frequency(n)	Percentage
Age of the respondent	15-29	1292	0.40%	804	0.20%
	30-39	6740	3.60%	6565	3.30%
	40-49	14021	9.20%	16247	9.70%
Place of Residence	Urban	6594	2.70%	5988	2.50%
	Rural	15459	3.40%	17628	3.60%
Religion	Hindu	18891	3.40%	20234	3.40%
	Muslim	2092	2.20%	2248	2.30%
	Christian	556	3.30%	553	3.30%
	Other	515	2.30%	581	2.90%
Caste	SC/ST	5537	2.70%	6371	2.80%
	OBC	10847	3.60%	11285	3.60%
	others	5008	3.10%	5090	3.30%
Respondents Educational Status	No education	11000	5.70%	11618	7.20%
	Primary	3714	4.30%	3949	4.70%
	Secondary	6495	2.00%	7206	2.00%
	Higher	844	0.90%	843	0.70%
Current Marital status	Never married	61	0.00%	63	0.00%
	Married/Living with partner	20229	4.00%	21624	4.10%
	Widowed/Divorced/separated	1763	6.00%	1929	6.30%
Wealth Index	Poor	7233	2.80%	8870	3.20%
	Middle	5177	3.60%	5483	3.70%
	Rich	9643	3.30%	9263	3.10%
Having Health Insurance	No	15046	2.70%	14742	2.90%
	Yes	7007	4.90%	8874	4.10%
Total no of children	nulliparous	452	0.20%	435	0.20%
	uniparous	1563	1.60%	1733	1.70%

	multiparous	20038	5.20%	21448	5.40%
Whether sterilized or not	No	11881	2.40%	10823	2.10%
	Yes	10172	5.20%	12793	6.10%
Have terminated pregnancy	No	18697	3.00%	19709	3.10%
	Yes	3356	4.00%	3907	4.40%
Had Anemia	no	12085	3.80%	11862	4.00%
	had anaemia	9344	2.60%	10512	2.70%
BMI	<18.5	2840	1.80%	2216	1.70%
	18.5-24.99	10682	2.70%	11713	2.90%
	>=25	8064	5.80%	8909	5.40%
Have NCD	No	16481	2.70%	19252	2.90%
	Yes	5572	6.80%	4363	8.70%

The analysis of hysterectomy prevalence across various socio-demographic and health-related characteristics using NFHS-4 and NFHS-5 data reveals important patterns and shifts. Hysterectomy is significantly more prevalent among older women, especially those aged 40–49 years, with rates increasing from 9.2% in NFHS-4 to 9.7% in NFHS-5, compared to just 0.4% to 0.2% among women aged 15–29. Rural women consistently show higher prevalence (3.4% to 3.6%) than their urban counterparts (2.7% to 2.5%), indicating potential differences in access to gynecological care or early treatment options. Religion-wise, the prevalence among Hindu women remained stable at 3.4%, while slight increases were observed among Muslims (2.2% to 2.3%) and others (2.3% to 2.9%).

Caste differences show a marginal increase across all categories, with OBC women reporting the highest prevalence (3.6% in both rounds), followed by SC/ST and others. Educational status shows an inverse relationship with hysterectomy prevalence: women with no education had the highest rates, increasing from 5.7% to 7.2%, while women with higher education showed very low prevalence (0.9% to 0.7%), suggesting the role of awareness and access to alternatives. Marital status also influences prevalence, with widowed/divorced/separated women having higher rates (6.0% to 6.3%) than married women (4.0% to 4.1%) and almost negligible rates among never-married women.

Wealth status presents a mixed pattern, with prevalence increasing slightly among the poor (2.8% to 3.2%) and middle-income groups (3.6% to 3.7%), while it slightly declined among the

rich (3.3% to 3.1%). Interestingly, women with health insurance reported higher prevalence (4.9% to 4.1%) compared to uninsured women, perhaps reflecting increased healthcare access or reporting. Parity also shows a clear trend: multiparous women reported the highest prevalence (5.2% to 5.4%), while it was negligible among nulliparous women. Hysterectomy prevalence was also notably higher among sterilized women (5.2% to 6.1%) and those who had a terminated pregnancy (4.0% to 4.4%) compared to their counterparts.

Health-related indicators show that anemic women consistently had lower reported hysterectomy prevalence (2.6% to 2.7%) than non-anemic women (3.8% to 4.0%). BMI analysis reveals higher prevalence among overweight/obese women (≥ 25 BMI), though it slightly declined from 5.8% to 5.4%. Lastly, women with non-communicable diseases (NCDs) reported notably higher hysterectomy rates compared to those without—rising from 6.8% in NFHS-4 to 8.7% in NFHS-5, indicating a strong association between chronic health conditions and surgical intervention. These findings highlight the intersection of health, education, wealth, and access factors in determining hysterectomy patterns in India and underscore the need for policy efforts targeting early reproductive care and informed surgical decisions.

Table 4
Comparison of Estimates from multivariable logistic regression analysis by background characteristics in India by NFHS 4 and NFHS 5,

Characteristics	Category	NFHS 4				NFHS 5			
		Sig.	Exp(B)	95% C.I.for EXP(B)		Sig.	Exp(B)	95% C.I.for EXP(B)	
				Lower	Upper			Lower	Upper
Age of the respondent	15-29	0.000				0.000			
	30-39	0.000	4.349	4.078	4.639	0.000	6.133	5.665	6.64
	40-49	0.000	9.947	9.333	10.601	0.000	15.335	14.177	16.587
Place of Residence	Urban								
	Rural	0.000	1.377	1.329	1.428	0.000	1.435	1.383	1.488
Religion	Hindu	0.000							
	Muslim	0.000	0.623	0.591	0.657	0.000	0.677	0.642	0.713
	Christian	0.384	0.96	0.875	1.053	0.759	1.015	0.924	1.114
	Other	0.000	0.706	0.643	0.775	0.000	0.789	0.717	0.868
Caste	SC/ST	0.000							
	OBC	0.000	1.338	1.291	1.386	0.000	1.324	1.279	1.37

	others	0.000	1.238	1.186	1.293	0.000	1.347	1.291	1.405
Respondents Educational Status	No education	0.000							
	Primary	0.000	0.858	0.823	0.894	0.000	0.768	0.737	0.799
	Secondary	0.000	0.578	0.556	0.601	0.000	0.526	0.508	0.546
	Higher	0.000	0.323	0.298	0.35	0.000	0.241	0.222	0.262
Current Marital status	Never married	0.000							
	Married/ Living with partner	0.000	8.517	6.398	11.336	0.000	7.469	5.503	10.138
	Widowed/ Divorced/ separated	0.000	8.292	6.205	11.079	0.000	6.949	5.103	9.463
Wealth Index	Poor	0.000							
	Middle	0.000	1.412	1.357	1.47	0.000	1.209	1.163	1.257
	Rich	0.000	1.568	1.504	1.636	0.000	1.283	1.232	1.335
Having Health Insurance	No								
	Yes	0.000	1.558	1.51	1.608	0.000	1.107	1.075	1.14
Total no of children	nulliparous	0.000							
	uniparous	0.000	1.628	1.45	1.828	0.000	1.656	1.468	1.869
	multiparous	0.000	2.902	2.61	3.226	0.000	2.415	2.16	2.7
Whether sterilized or not	No								
	Yes	0.000	0.708	0.687	0.73	0.000	0.923	0.896	0.952
Have terminated pregnancy	No								
	Yes	0.004	0.944	0.907	0.982	0.039	1.041	1.002	1.081
Had anaemia	No								
	Had anaemia	0.000	0.671	0.652	0.691	0.000	0.649	0.631	0.667
BMI	<18.5	0.000							
	18.5-24.99	0.030	1.050	1.005	1.098	0.082	1.045	0.994	1.097
	>=25	0.000	1.471	1.4	1.545	0.000	1.334	1.266	1.406
Have NCD	No								
	Yes	0.000	1.241	1.199	1.284	0.000	1.74	1.675	1.807

The multivariate logistic regression analysis identifies significant predictors of hysterectomy among Indian women aged 15–49 in both NFHS-4 and NFHS-5. Age emerges as a strong determinant, with women aged 40–49 being nearly 10 times (AOR=9.95) more likely to undergo hysterectomy in NFHS-4 and over 15 times (AOR=15.34) in NFHS-5 compared to those aged 15–29. Similarly, women aged 30–39 also show significantly elevated odds. Rural residence is consistently associated with higher odds of hysterectomy than urban areas, with adjusted odds ratios (AORs) of 1.38 in NFHS-4 and 1.44 in NFHS-5, suggesting possible disparities in healthcare access or surgical practice.

Religion also influences the likelihood, with Muslim and ‘Other’ religious group women significantly less likely to undergo hysterectomy than Hindus. Caste differences show OBC and ‘Other’ caste women having higher odds compared to SC/ST women in both rounds. Education is a protective factor: women with higher education were 76–85% less likely to undergo hysterectomy compared to those with no education. This inverse relationship is consistent across all levels of education and reflects the role of awareness and access to alternatives.

Marital status is another strong predictor, with both married and widowed/divorced/separated women showing 7–8 times higher odds compared to never-married women, likely due to increased parity and reproductive health exposure. In terms of economic status, the richest women had 1.57 times higher odds in NFHS-4 and 1.28 in NFHS-5 compared to the poorest, suggesting financial access to private surgical care plays a role. Interestingly, women with health insurance had significantly increased odds in NFHS-4 (AOR=1.56), though the effect was more modest in NFHS-5 (AOR=1.11).

Reproductive history also significantly predicts hysterectomy. Multiparous women were 2.9 times more likely in NFHS-4 and 2.4 times in NFHS-5 compared to nulliparous women. Women with terminated pregnancies showed a mixed effect: a slight decrease in odds in NFHS-4 (AOR=0.94) and a slight increase in NFHS-5 (AOR=1.04). Women who had undergone female sterilization showed lower odds in both surveys, especially in NFHS-4 (AOR=0.71).

Among health factors, anemia was associated with significantly lower odds of hysterectomy in both rounds (AOR=0.67 in NFHS-4 and 0.65 in NFHS-5), possibly indicating health-based contraindications or underuse of services. Regarding BMI, overweight/obese women (BMI \geq 25) had higher odds (AOR=1.47 in NFHS-4 and 1.33 in NFHS-5) compared to underweight women, pointing to a possible association with metabolic conditions. Lastly, women with non-communicable diseases (NCDs) were significantly more likely to undergo hysterectomy, with the odds increasing from 1.24 in NFHS-4 to 1.74 in NFHS-5, highlighting a growing link between chronic conditions and surgical gynecological care.

Discussion

Our study confirms that hysterectomy prevalence in India remains relatively low (3.2% in NFHS-4; 3.3% in NFHS-5) among women aged 15–49, but marked regional disparities persist. The Southern and Eastern regions—including Andhra Pradesh (8.9%→8.7%), Telangana (7.7%→8.2%), and Bihar (5.4%→6.0%)—show significantly higher rates than the national average, corroborating earlier NFHS-4 findings, which reported Andhra Pradesh rates as high as 16% among women aged 30–49 and flagged Southern states as consistent outliers (Shekhar, C. et.al, 2019). Notably, our results parallel findings from NFHS-5 data, which highlighted that private facilities conducted nearly 70% of hysterectomies nationally, with the North-eastern region being the only exception where public facilities dominated. The predominance of the private sector aligns with reported financial and infrastructural dynamics, potentially incentivizing surgical interventions.

Our regression analyses reaffirm well-documented risk predictors. As seen in both NFHS rounds, increasing age stands out as the strongest predictor—with women aged 40–49 carrying 10 to 15-fold higher odds, consistent with other studies (Singh, S.K et.al, 2024)

The decision to undergo hysterectomy is highly dependent on the age of women, as the odds of older women undergoing hysterectomy are 10 to 20 times higher than those of younger women. Despite the higher odds, the reason for undergoing hysterectomy is not directly associated with age, as studies attribute the higher incidence of hysterectomy to the worsening health status of women associated with older age such as cancer (Janda et al., 2018). Another reason is the changing fertility preferences, as older women are keen to undergo hysterectomy as they approach menopause to prevent further surgeries (Ramage et al., 2023).

Rural residence also emerged as a risk factor (AOR ~1.4), aligning with past evidence suggesting slower access to alternative treatments and reliance on definitive surgery in rural areas.

Women living in rural areas are more likely to undergo hysterectomy, which is attributed to the low level of healthcare accessibility in these areas (Adam et al., 2022; Kumari & Kundu, 2022). Another reason could be the prevalence of early marriage among women living in rural India, which increases the incidence of reproductive diseases that could result in hysterectomy (Kumari & Kundu, 2022). The lack of information accessibility could also be a reason for higher hysterectomy rates, as the incidence of hysterectomy decreases as the education of women increases, indicating that informed choice and awareness of alternatives will reduce the reliance on hysterectomy (Prusty et al., 2018). Hindu women appear to have a higher reliance on hysterectomy than Muslim and Christian women do, which could be attributed to their higher

incidence of early marriage, higher parity, and lower levels of schooling. These factors are strongly associated with hysterectomy prevalence (Prusty et al., 2018; Shekhar et al., 2019).

Educational attainment shows a powerful inverse association: women with higher education had around 70–85% lower odds of hysterectomy. This protective effect mirrors prior findings that literacy empowers women to seek non-surgical treatments and exercise agency. Parity, too, displayed a clear dose–response relationship: multiparous women had substantially higher odds, confirming results reported both in NFHS-4 and in regional studies (ShekharC,et al 2019).

Similarly, single women are less likely to undergo hysterectomy because they are mostly younger and less willing to do so because they prefer having a child, which would prevent them from undergoing surgery (Janda et al., 2018; Ramage et al., 2023). Another variable with a significant effect was the number of children in which nulliparous women were less likely to undergo hysterectomy as they tried to preserve their reproductive potential (Prusty et al., 2018). Moreover, nulliparous women are less likely to use contraceptives because of misconceptions about their effects on fertility (Lohr et al., 2017). Younger women, especially those who are single and/or nulliparous, are less likely to undergo hysterectomy because of their fertility preferences, as validated by King et al. who stated that younger women who had undergone hysterectomy regretted their decision (King et al., 2023).

Health characteristics such as overweight/obesity and presence of NCDs were also independently associated with elevated odds. High BMI (≥ 25) increased odds by 1.3–1.5 times, consistent with obesity’s association with uterine fibroids and heavier bleeding. Similarly, the rising AOR for NCDs—from 1.24 in NFHS-4 to 1.74 in NFHS-5—supports emerging evidence linking chronic illnesses like hypertension, diabetes, and joint disorders to hysterectomy risk.

The odds of an obese woman undergoing hysterectomy are higher, as they are at a higher risk of developing chronic diseases such as endometrial cancer (Kiesel et al., 2020). Laparoscopic hysterectomy is preferred by physicians for obese patients as it is less invasive than abdominal hysterectomy; however, minimally invasive surgeries would likely increase superficial wound infection, impacting surgical morbidity (Jalloul et al., 2020; Tyan, Amdur, et al., 2020). The variable sterilization revealed an interesting result, as sterilized women were more likely to undergo hysterectomy in 2015 but less likely to undergo hysterectomy in 2019. This contradicts the findings of Prusty et al., who claimed that sterilized women are more likely to undergo hysterectomy (Prusty et al., 2018). This is likely due to the increased cost of such surgeries, as sterilization clinics are more accessible than hysterectomy clinics, especially among poor women (Desai et al., 2019; White & Potter, 2014). This was validated by our results as well, as poor women had lower odds than middle-class women or rich women in undergoing hysterectomy, which is likely due to the higher cultural and social stigma surrounding them and low medical

accessibility (Desai et al., 2017). Women with SC/ST in the country face similar challenges to poor women, as they have lower odds of undergoing hysterectomy; Shekhar et al. attributed this to the lack of awareness and poor healthcare accessibility as the reasons for lower hysterectomy incidence among them (Shekhar et al., 2019).

Socioeconomic factors also played a role: OBC and “other” caste categories showed higher odds than SC/ST women, potentially reflecting unequal access to healthcare services. Women in the highest wealth quintile were more likely to undergo hysterectomy than poorer women (AOR 1.28–1.57), reflecting ability to access private surgical care, as seen in previous research.

Women with non-communicable diseases have a higher incidence of hysterectomy in India, and the odds have dramatically increased since 2015, as having NCDs was not a significant predictor of hysterectomy during that period. This was validated by Rout et al. as women with NCDs are more likely to experience decreased ovarian function and reduced estrogen levels, necessitating hysterectomy (Rout et al., 2023). There is also a possible reverse causation, as Desai et al. pointed out that women who had undergone hysterectomy are more likely to develop NCDs, such as hypertension, diabetes, and high cholesterol. They attributed this to the higher incidence of early menopause among Indian women due to hysterectomy, which causes hormonal changes and leads to the initiation of NCDs (Desai et al., 2023). Women with anemia are less likely to undergo hysterectomy, which may be because of the higher risk of complications associated with invasive procedures. Severe anemia increases the chances of extended hospital stays, readmissions, and overall surgical complications; therefore, if patients are anemic, physicians should treat them first before the procedure (Tyan, Taher, et al., 2020). Contrary to popular beliefs, health insurance decreased the odds of performing hysterectomy in the latest round of NFHS. This is in contrast to the previous round in which women with health insurance were more likely to undergo hysterectomy. Our finding has contradicted the findings of Singh, and Rout, D et al., who claimed that the health insurance would increase the chances of hysterectomy (Rout et al., 2023; Singh, 2024).

Some intriguing patterns emerged around sterilization and terminated pregnancies. Sterilized women had lower odds of hysterectomy, possibly due to reduced reproductive morbidity or earlier family completion; similar findings have been reported elsewhere. Women with a history of terminated pregnancy showed slight variation—from a marginally reduced odds in NFHS-4 to a small increase in NFHS-5—potentially reflecting evolving reporting norms or improved access to therapeutic services.

Our findings have important policy implications. High regional variation, especially in states such as Andhra Pradesh and Beed district (Maharashtra), where community reports estimate alarming hysterectomy rates among young women (Shekhar C et al 2019) underscores the need

for regulatory oversight. While newer policies like Ayushman Bharat expand insurance coverage—which may improve access—there is a concurrent risk of misuse in the private sector, especially where profit incentives are strong (Shekhar C et al 2019). Strengthening medical guidelines, expanding access to non-surgical alternatives, and enhancing surveillance are essential. Additionally, tailored interventions should focus on education, rural health infrastructure, and early detection of reproductive morbidities to reduce unnecessary surgical interventions.

Understanding the specific reproductive health characteristics of women of reproductive age and the underlying causes of increased hysterectomy rates would help identify and target modifiable risk factors in women's health. This could reduce the incidence of unnecessary hysterectomies, thereby preserving reproductive health when possible, improving overall well-being, and reducing the length and cost of hospital admissions and promote safer and more equitable reproductive healthcare services.

Limitations of this study include reliance on self-reported hysterectomy status and limited data on clinical indications, type of surgery, and post-operative outcomes. Future survey rounds should collect granular data on reasons for hysterectomy, decision-making processes, and health outcomes to guide policy and practice .

Conclusion

This study reveals that the prevalence of hysterectomy among Indian women aged 15–49 years has remained relatively stable, with a marginal increase from 3.2% in NFHS-4 to 3.3% in NFHS-5. However, significant regional disparities persist, with southern and eastern states—such as Andhra Pradesh, Telangana, and Bihar—reporting the highest rates, while northeastern and many northern states continue to show considerably lower prevalence. These variations reflect the influence of healthcare infrastructure, access to gynaecological care, socioeconomic conditions, and cultural practices.

Multivariate analysis highlights that socio demographic, reproductive, and health-related factors strongly influence the likelihood of undergoing a hysterectomy. Older age, rural residence, lower education, multiparity, presence of NCDs, and being from higher wealth quintiles or having health insurance significantly increase the odds of undergoing the procedure. Conversely, higher educational attainment and anemia appear to be protective factors.

Importantly, the increasing reliance on private healthcare facilities for hysterectomy points toward potential issues of over-medicalization and lack of standard treatment protocols, especially in high-prevalence regions. The findings underscore the need for greater clinical oversight, patient education, and regulatory policies to ensure that hysterectomy is used as a

medically justified, last-resort intervention rather than a routine response to manageable gynecological conditions.

In light of these insights, policymakers must prioritize strengthening public health services, enhancing awareness of non-surgical alternatives, improving reproductive healthcare access—especially in underserved regions—and enforcing medical guidelines to curb unnecessary surgical interventions. Future research should also explore qualitative dimensions, including women's experiences and decision-making processes, to further inform evidence-based health interventions in reproductive care.

Limitations

NFHS datasets may not provide in-depth information on the type of hysterectomy (e.g., abdominal or vaginal), reasons for the procedure, or postsurgical complications. NFHS is cross-sectional; therefore, longitudinal insights into how variables affect hysterectomy prevalence over time are not possible. Women may underreport undergoing hysterectomy because of cultural or social stigma, especially in rural or less-educated populations. NFHS does not provide causal insights into why hysterectomy is performed (e.g., fibroids, endometriosis, uterine prolapse, or cancer). The age groups (15–29, 30–39, 40–49) may not fully capture the lifetime prevalence of hysterectomy, as procedures often occur beyond 49 years

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