



Increasing the Coverage of Male Sterilization (NSV) in India: Lessons from the Experiences of Telangana State

Vinodh Thota^{1*} T.V. Sekher²

Abstract

Vasectomy is a safe, easy, and affordable procedure; however, it is not commonly used in India as a family planning method. Male sterilization can aid couples in achieving healthier reproductive outcomes and reduce unintended pregnancies. Despite many advantages, according to NFHS-5, a mere 0.3 percent of males avail this method of contraception, whereas the level of female sterilization stands at 36 percent in India. This study aims to provide insights on the factors that influence men to accept male sterilization. The study used structured schedules to conduct interviews among men (403) aged 23-49 in Karimnagar, Warangal, and Hanumakonda, three relatively better-performing districts with regard to vasectomy coverage in Telangana State. The Binary Logistic regression has shown that wife's level of education and occupation, number of living children, already having sterilized male family member, type of last delivery, motivation, and awareness of NSV are the factors that determine the acceptance of vasectomy. Men already having a sterilized male family member are 3.7 times more likely to accept vasectomy. It is suggested that to popularize vasectomy, it is essential to create awareness and motivate couples about advantages of vasectomy, and facilitate an atmosphere where men may learn from satisfied vasectomy acceptors on the importance of involvement in family planning.

Keywords

Contraception,
 Family Planning,
 India, Male
 sterilization,
 No-Scalpel
 Vasectomy (NSV)

* *Corresponding Author*

¹ Senior Research Scholar, Department of Family and Generations, International Institute for Population Sciences, Mumbai, Maharashtra, 400088, India. Email: vinodhthota3@gmail.com

² Professor, Head, Department of Family and Generations, International Institute for Population Sciences, Mumbai, Maharashtra, 400088, India. Email: tvsekher@iipsindia.ac.in

Introduction

Although vasectomy (male sterilization) is a safe, simple, and cost-effective procedure, its acceptance as a family planning method remains very low in India. This is despite the fact that male sterilization can help reduce the burden of unintended pregnancies and improve reproductive health outcomes for couples (Jain & Singh, 2010). The first vasectomy programme on a national scale was launched in 1954 in India. Before the introduction of laparoscopic tubectomy in India, vasectomy was the mainstay of sterilization, accounting for about 85 to 90 percent of the sterilizations. During the Emergency Period (1975-77), almost 6.5 million sterilizations were performed, marking the largest ever occurring in any country (Srinivasan, 2017).

Given its many advantages, vasectomy should be an important family planning method. Worldwide, fewer than 35 percent of married or unioned women aged 15 to 49 rely on a partner's vasectomy for contraception. However, in developing countries, vasectomy acceptance is just 2.5 percent; the largest number of vasectomized men are in China (7 percent) (Kols & Lande, 2008). Vasectomy has started losing its popularity, and the focus has now shifted towards female sterilization. The reasons for the low and declining level of acceptance of vasectomy are health professionals' lack of knowledge, misinformation, and personal dislike of vasectomy, or untested presumptions about men's thoughts and desires (Manual for male sterilization, 2013).

Historically, family planning programs have typically been geared towards women, neglecting the significant role males can and ought to play in making choices and using contraceptives. It has historically been the main focus of reproductive health activities,

and in India, due to societal pressure and programming emphasis, family planning programs exclusively served mainly women. Although both men and women play significant roles in the conception of children, most demographic research on fertility and family planning has concentrated on women (Greene & Biddlecom, 2000).

In order to increase the acceptance of male sterilization in India, it is important to understand the determinants of its uptake. Several studies have explored the factors influencing men's decision to undergo vasectomy, including cultural beliefs, lack of knowledge, misinformation, healthcare providers' attitudes, and socioeconomic factors (Mittal & Bhatnagar, 2013). Cultural beliefs play a significant role in the acceptance of male sterilization in India. In traditional Indian society, male infertility is often seen as a source of shame and dishonor (Jain & Singh, 2010). This can lead men to view vasectomy negatively, perceiving it as shameful or a sign of weakness.

Additionally, the cultural emphasis on having male offspring can lead to resistance to male sterilization, as men may view it as a threat to their ability to have children (Pandey & Pandey, 2015). Lack of knowledge and misinformation about vasectomy can also contribute to its low acceptance rates in India. Many men may not understand the procedure or its benefits and believe that it will affect their sexual performance or masculinity (Mittal & Bhatnagar, 2013). This lack of understanding can also result in fears about the safety and reliability of vasectomy. Healthcare providers' attitudes and practices can also have an impact on male sterilization uptake. In some cases, healthcare providers may lack

adequate training or resources to provide vasectomy services, or they may hold personal beliefs that discourage them (Pandey and Pandey, 2015). Research on Indian couples' desire to use contraception found that the husbands' reproductive intentions significantly impact the women's intent to use contraception (Singh, Ram, & Ranjan, 2006). Men from disadvantaged backgrounds may encounter barriers in accessing vasectomy services, such as lack of transportation or financial resources.

Additionally, they may be less likely to receive correct information and counseling about vasectomy, and may not understand the importance of family planning in promoting reproductive health (Jain & Singh, 2010). Although the coverage of male sterilization is very negligible in India as a whole (Figure 1), there are few states like Telangana that have some districts with relatively high male sterilization acceptance (Table 1).

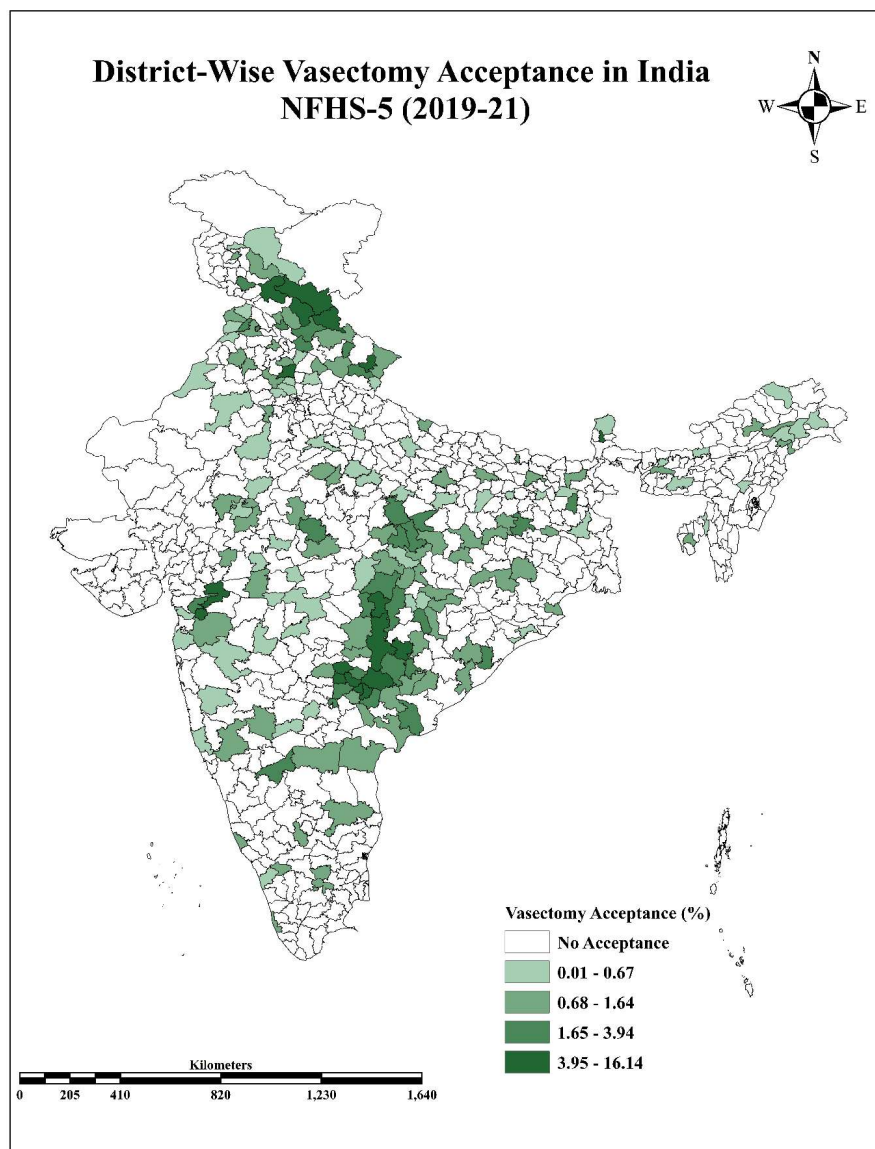


Figure 1 District-wise Vasectomy Acceptance in India: NFHS-5 (2019-21)

Table 1 Levels and Trends of Vasectomy Acceptance in India from NFHS-1-to NFHS-5 (1992-2021)

State	NFHS 1	NFHS 2	NFHS 3	NFHS 4	NFHS 5
India	3.5	1.9	1.0	0.3	0.3
North					
Chandigarh (UT)	na	na	na	1.3	0.3
NCT Delhi	3.2	2.3	0.8	0.2	0.2
Haryana	5.0	2.1	0.7	0.6	0.9
Himachal Pradesh	13.2	7.3	6.3	2.4	3.3
Jammu and Kashmir	na	2.7	2.6	0.4	0.3
Ladakh	na	na	na	na	0.4
Punjab	2.5	1.6	1.2	0.6	0.5
Rajasthan	2.4	1.5	0.8	0.2	0.3
Uttarakhand	na	3.8	1.8	0.7	0.7
Central					
Chhattisgarh	na	3.3	3.3	0.7	0.8
Madhya Pradesh	na	1.9	1.3	0.5	0.7
Uttar Pradesh	na	0.5	0.2	0.1	0.1
East					
Bihar	na	1.0	0.6	0.0	0.1
Jharkhand	na	0.9	0.4	0.2	0.3
Odisha	3.4	1.7	1.0	0.2	0.3
West Bengal	4.3	0.8	0.7	0.1	0.1
Northeast					
Arunachal Pradesh	0.4	0.1	0.1	0.0	0.0
Assam	2.4	1.0	0.2	0.1	0.1
Manipur	2.9	1.1	0.5	0.1	0.0
Meghalaya	0.6	0.0	0.1	0.0	0.0
Mizoram	0.1	0.1	0.0	0.0	0.0
Nagaland	0.1	0.0	0.0	0.0	0.0
Sikkim	na	2.4	4.5	3.4	1.7
Tripura	2.4	0.6	0.5	0.0	0.0
West					
Dadra and Nagar Haveli (UT)	na	na	na	0.0	0.1
Goa	1.0	0.4	0.1	0.0	0.0
Gujarat	3.5	2.3	0.6	0.1	0.2
Maharashtra	6.2	3.7	2.1	0.4	0.4
South					
Andaman and Nicobar Island (UT)	na	na	na	0.0	0.2
Andhra Pradesh	6.7	4.3	2.9	0.6	0.4
Karnataka	1.5	0.7	0.2	0.1	0.0
Kerala	6.5	2.5	1.0	0.1	0.1
Lakshadweep (UT)	na	na	na	0.0	0.0
Puducherry	na	na	na	0.0	0.3
Tamil Nadu	2.0	0.8	0.4	0.0	0.1
Telangana	na	na	na	1.6	2.0

Source: National Family Health Survey, I-V rounds (1992-2021); 'na' – not available

In the state of Telangana (formerly part of Andhra Pradesh), there are two districts, viz Warangal and Karimnagar, where male sterilization has been prevailing at a significant rate for nearly 30 years (Murthy & Rao, 2003). Following the introduction of NSV (No-Scalpel Vasectomy) in India in 1998, then Karimnagar district Collector Debabrata Kantha initiated a campaign to encourage small family norms and popularized the sterilization of men. Within a short span of two years, the district medical administration performed a record one lakh (1,00,000) sterilizations

with more than 50 percent of them being NSV and set a national record. Several factors, such as political and bureaucratic commitment, motivational strategies employing multi-sector and social mobilization methods, the promotion of well-organized vasectomy camps for NSV operations, innovative incentive schemes, effective counselling, and follow-up services ensuring client satisfaction, contributed to the widespread acceptance of vasectomy in the districts of Karimnagar and Warangal in Andhra Pradesh (Murthy & Rao, 2003).

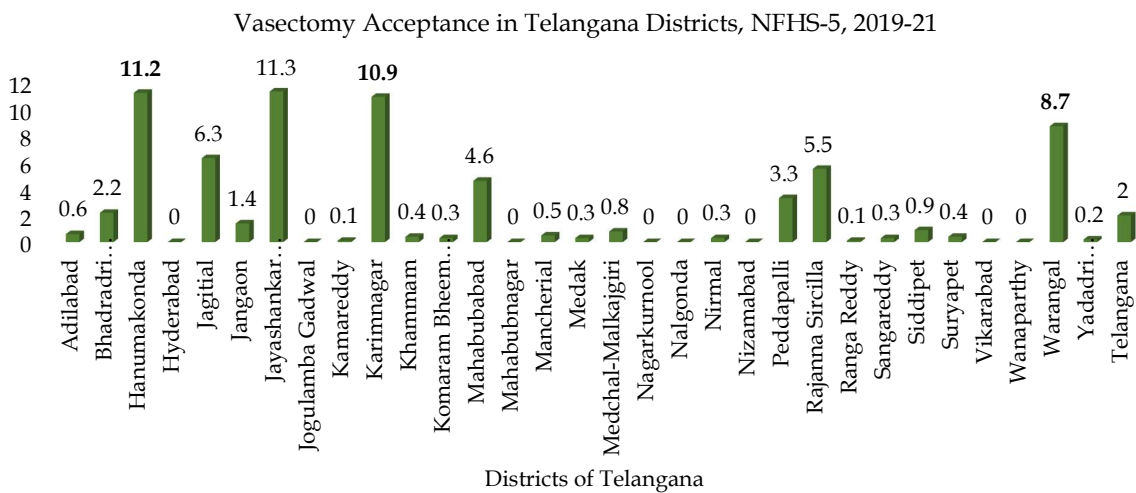


Figure 2 Vasectomy Acceptance in Telangana Districts: NFHS-5 (2019-21)

Therefore, to promote male sterilization, it is necessary to understand the socio-economic characteristics of male sterilization acceptors and the influencing factors that motivate them to accept male sterilization. The present study, carried out in the selected three districts (Karimnagar, Warangal, and Hanumakonda) of Telangana state, having a relatively high acceptance of male sterilization, will help us understand the factors and reasons behind the relatively higher acceptance of vasectomy.

Materials and Methods

This study is based on a primary survey using structured schedules to conduct interviews among men aged 23-49 in the districts of Karimnagar, Warangal, and Hanumakonda in Telangana state, India. From these three districts, data regarding the annual PHC-wise vasectomy acceptors has been obtained from the District Medical and Health Offices (DM&HO). Based on the performance of PHCs in vasectomy acceptance, three top-performing PHCs have been identified for the study.

From the highly performing sub-centres and villages of these PHCs, vasectomy acceptors and non-acceptors were selected using a purposive random sampling method and interviewed. The total sample collected from the three districts is 403. Among them, 133 men in Warangal, 134 men in Hanumakonda and 136 men in Karimnagar district were personally interviewed. From the sample 403, 203 men have undergone vasectomy and 200 men whose wives have undergone tubectomy (female sterilization). Beside the quantitative data based on the survey, the study also identified five Key-Informants in each tier of the health care system- ASHA worker, ANM, Medical Officer in PHC, NSV surgeon, and the District Medical and Health Officer, and collected information through detailed interviews and discussions.

The survey data were collected by administering the structured interview schedules by identifying sterilized men and husbands of sterilized women with the help of local health functionaries- ASHA and ANM of the selected localities from July to October 2022. The data was collected using CAPI (Computer-Assisted Personal Interviewing) with the help of KoboToolBox software. STATA version 16 is used to analyse the data.

A descriptive analysis was carried out to examine the distribution of the selected men from the three districts by several socioeconomic, demographic and sterilization-related characteristics. Bivariate analysis was conducted to test the unadjusted associations of various socioeconomic, demographic and sterilization characteristics with the vasectomy acceptors and non-acceptors. These tables were supplemented with Chi-square p-values. Furthermore, a binary logistic regression was used. It is derived

from the general linear regression model but tailored for situations where the dependent variable has two distinct outcomes, commonly labelled as "success" and "failure" or represented by "1" and "0."

The form of the logistic function is b_1x_1

$$P = \frac{\exp(a + b_1x_1 + b_2x_2 + b_3x_3 + \dots)}{1 + \exp(a + b_1x_1 + b_2x_2 + b_3x_3 + \dots)}$$

Where P represents the probability that a case is in a particular category,

Exp = the exponential function,

a = the constant (or intercept) of the equation and,

b = the coefficient (or slope) of the predictor variables.

In this study, men undergone vasectomy ('yes' or 'no') is the dependent variable and age, religion, caste, family size, type of house, wealth status, type of family, education, occupation, media exposure, spousal age gap at marriage, number of living children, sex of the last child, type of last delivery, desired number of children, did anybody motivate for NSV, having any male family member underwent vasectomy and awareness of NSV are the independent variables.

Given that the data has been collected in three distinct sections- namely individual and household, marriage and family, and information related to sterilization, the regression analysis involved running four separate models. Model 1 examines the significance of variables related to individual and household factors on the dependent variable (accepting vasectomy). Model 2 explores the impact of marriage and family-related variables on the dependent variable. Model 3 focuses on the influence of variables related to sterilization on accepting vasectomy. Finally, in Model 4, all variables

are considered together to assess the collective influence of these variables on accepting or not accepting vasectomy.

Results

Socio-economic, demographic and sterilization profiles of the respondents

The majority of male respondents interviewed (71 percent) are between the ages of 30 and 39, with 20 percent of men aged 40 or older and 10 percent aged 23 to 29. The overwhelming majority of respondents (94 percent) belong to Hindu religion, with the remaining belonging to other religions. Of the respondents, 58 percent are Other Backward Classes (OBC), while 29 percent are Scheduled Castes (SC), and 10 percent are Scheduled Tribes (ST). A little over half of the respondents have four members in their households (56 percent), while 23 percent having five members and 21 percent having six or more household members. A little over half of the respondents live in pucca houses (52 percent). The majority of the respondents belong to the middle economic status. Almost all respondents live in nuclear families (95 percent) and in their own homes (97 percent), with only 5 percent living in joint families and 3 percent living in rental homes. In terms of education, almost half of the respondents have completed a secondary level of education (46 percent), with 25 percent having a graduate degree, and 18 percent having a higher secondary level of education (see Table 2). The educational levels of the respondents' wives varied, with 44 percent having a secondary level of education, followed by 19 percent who completed higher secondary education, and 16 percent who graduated. Among the male respondents, one-third worked on their own agricultural land, while 25 percent worked as skilled or unskilled labor, 12 percent

worked as agricultural labor, and nine percent worked as private or government employees. Regarding media exposure, 23 percent of respondents had low levels, 38 percent had medium levels, and 39 percent had high levels. The spousal age gap at the time of marriage was less than five years for 52 percent of respondents, five to nine years for 43 percent of couples, and ten or more years for five percent of couples. The majority of men interviewed (86 percent) had one or two children, while 14 percent had three or four children. Seven in ten couples (68.5 percent) underwent caesarean section during the last delivery.

"Most of the women get sterilization at the time of caesarean section. But doctors do not recommend sterilization if the baby is born underweight or unhealthy. Couple with underweight or unhealthy born child prefer to have sterilization once the baby got healthy. This is the scenario with most of the couples. But there are some couples where men accepted vasectomy even if his wife had caesarean and the baby was born not healthy" -ASHA Worker, Hanumakonda District.

After marriage, 81 percent of couples desired to have one or two children, three percent wanted three or four children, and 16 percent had no specific preference for the children. Regarding male sterilization, 52 percent of respondents stated that they had never been motivated for it, while the rest (48 percent) were motivated by health workers, doctors, family members, relatives, or friends. Awareness of No-Scalpel Vasectomy (NSV) was low among 61 percent of men, with 31 percent having no awareness and eight percent having a high level of awareness. Furthermore, 76 percent of respondents had male family members who underwent vasectomy before which would have certainly influenced their decision.

Table 2 Percent Distribution of Men by Selected Socio-Economic and Demographic Characteristics

Characteristics		percent	N
Age	23-29	9.68	39
	30-34	34.99	141
	35-39	35.73	144
	40 & Above	19.60	79
Religion	Hindu	94.54	381
	Non-Hindu	5.46	22
Caste	Scheduled Castes	28.54	115
	Scheduled Tribes	9.93	40
	Other Backward Classes	58.31	235
	None of the above	3.23	13
Household size	Up to 4	55.58	224
	5	23.08	93
	6 & More	21.34	86
Type of House	Pucca	52.36	211
	Semi-Pucca/Kachha	47.64	192
Economic Status	Poor	7.94	32
	Middle	86.85	350
	Rich	5.21	21
Type of family	Joint family	5.46	22
	Nuclear	94.54	381
Respondent's education	Illiterate	5.96	24
	Primary and below	5.71	23
	Secondary	45.66	184
	Higher Secondary	18.11	73
	Graduation	24.57	99
Wife's education	Illiterate	7.94	32
	Primary and below	13.40	54
	Secondary	43.67	176
	Higher Secondary	19.35	78
	Graduation	15.63	63
Respondent's occupation	Agricultural labourer	12.16	49
	Agriculture cultivator	32.01	129
	Petty shop	11.17	45
	Private/Government employee	9.43	38
	Self employed	9.93	40
	Skilled/Unskilled labour	25.31	102
Wife's occupation	Agricultural labourer	21.84	88
	Agriculture cultivator	30.27	122
	Petty shop	26.23	106
	Private/Government employee	1.99	8
	Self employed	8.93	36
	Skilled/Unskilled labour	10.67	43
Media exposure	Low	23.08	93
	Medium	38.46	155
	High	38.46	155
Spousal age gap	Less than 5 years	52.36	211
	5-9 years	42.68	172
	10 years and above	4.96	20
Living Children	1-2 children	85.86	246
	3-4 children	14.14	57
Sex of last child	Female	41.44	167

	Male	58.56	236
Type of last delivery	Caesarean	68.49	276
	Normal	31.51	127
Number of desired children at the time of marriage	1-2 children	81.39	328
	3-4 children	2.73	11
	Can't say	15.88	64
Did anybody motivate you to have NSV?	Yes	48.14	194
	No	51.86	209
Awareness of NSV	No Awareness	30.52	123
	Low Awareness	61.04	246
	High Awareness	8.44	34
Has anyone of your male family member got sterilized before?	Yes	24.07	97
	No	75.93	306
Total		100.00	403

NSV acceptors and non-acceptors: Socio-economic and demographic profiles

This section provides an overview of the sample distribution between NSV acceptors and non-acceptors based on various socio-economic and demographic, marriage and family, and sterilization characteristics. Table 3 displays the distribution of these characteristics among vasectomy acceptors and non-acceptors, we interviewed. Hindus have a slightly lower acceptance rate (49 percent) compared to non-Hindus (68 percent). Acceptance rates are lower among ST and General categories (10 percent, 46 percent), whereas SC and OBC exhibit higher acceptance rates (53 percent, 55 percent) than non-acceptance rates (46 percent, 44 percent). Households with four or fewer members have the highest acceptance rate (53 percent) compared to larger families. Rich and middle-class individuals show higher acceptance rates (61 percent, 50 percent), while poor individuals have higher non-acceptance rates (56 percent). Respondents with primary and lower secondary education, secondary and higher secondary education have higher acceptance rates (52 percent, 53 percent, 50

percent)), Respondents with low media exposure have lower acceptance rates (44 percent) whereas those with medium level of media exposure have higher acceptance rates (54 percent). The acceptance of vasectomy is higher when the age gap between spouses is 10 years or more (60 percent). Couples with one or two living children have higher acceptance rates (52 percent) Vasectomy acceptance is higher when the last child is a girl (55 percent) whereas if the last child is a boy, acceptance rates are lower (47 percent). Acceptance rates are higher when the last birth was normal (67 percent) and lower, when it was a caesarean (57 percent). Motivation and knowledge significantly influence vasectomy acceptance. Those who receive any form of motivation have a higher likelihood of accepting. Acceptance rates are higher among those with some awareness of NSV. Acceptance rates are higher when respondents have male family members who have already undergone sterilization (76 percent).

Regarding being motivated and having awareness, a 33-year-old respondent from Warangal stated as below:

“My wife had already undergone two caesarean operations. The health workers have explained about vasectomy as a better method and motivated me. I used to run away whenever the health workers visited my house. Because people

have told me that I will have health complications after vasectomy. So, I was afraid of it. Later, I was somehow convinced to attend the vasectomy camp. I was very stressed and worried about the operation. But after vasectomy, I realised it is a very simple and easy operation. And I started my usual work on the third day after the operation. I have not faced any complications from vasectomy so far and am very much satisfied with it.”

Table 3 Percent of Vasectomy Acceptors and Non-Acceptors by their Individual Characteristics

Characteristics		Vasectomy Acceptors		Vasectomy Non-Acceptors	
		percent	N	percent	N
Age	23-29	35.90	14	64.1	25
	30-34	41.84	59	58.16	82
	35-39	54.17	78	45.83	66
	40 & Above	65.82	52	34.18	27
		<i>Chi2 p value-0.001</i>			
Religion	Hindu	49.34	188	50.66	193
	Non-Hindu	68.18	15	31.82	7
		<i>Chi2 p value-0.086</i>			
Caste	Scheduled Caste	53.91	62	46.09	53
	Scheduled Tribe	10.00	4	90.00	36
	Other Backward Class	55.74	131	44.26	104
	None of the above	46.15	6	53.85	7
		<i>Chi2 p value-0.000</i>			
Household size	Up to 4	53.13	119	46.88	105
	5	49.46	46	50.54	47
	6 & More	44.19	38	55.81	48
		<i>Chi2 p value-0.363</i>			
Type of House	Pucca	50.71	107	49.29	104
	Semi-Pucca/Kachha	50.00	96	50.00	96
		<i>Chi2 p value-0.887</i>			
Economic status	Poor	43.75	14	56.25	18
	Middle	50.29	176	49.71	174
	Rich	61.90	13	38.10	8
		<i>Chi2 p value-0.432</i>			
Type of family	Joint family	54.55	12	45.45	10
	Nuclear	50.13	191	49.87	190
		<i>Chi2 p value-0.687</i>			
Respondent's education	Illiterate	37.50	9	62.50	15
	Primary and below	52.17	12	47.83	11
	Secondary	53.80	99	46.20	85
	Higher Secondary	50.68	37	49.32	36
	Graduation	46.46	46	53.54	53
		<i>Chi2 p value-0.542</i>			
Wife's education	Illiterate	40.63	13	59.38	19
	Primary and below	31.48	17	68.52	37
	Secondary	51.14	90	48.86	86
	Higher Secondary	48.72	38	51.28	40
	Graduation	71.43	45	28.57	18

		<i>Chi2 p value-0.000</i>			
Respondent's occupation	Agricultural labourer	51.02	25	48.98	24
	Agriculture cultivators	43.41	56	56.59	73
	Petty shop	55.56	25	44.44	20
	Private/Government employee	50.00	19	50.00	19
	Self employed	67.50	27	32.50	13
	Skilled/Unskilled labour	50.00	51	50.00	51
			<i>Chi2 p value-0.174</i>		
Wife's occupation	Agricultural labourer	54.55	48	45.45	40
	Agriculture cultivator	41.80	51	58.20	71
	Petty shop	22.22	2	77.78	7
	Housewife	56.70	55	43.30	42
	Private/Government employee	87.50	7	12.50	1
	Self employed	63.89	23	36.11	13
	Skilled/Unskilled labour	39.53	17	60.47	26
		<i>Chi2 p value-0.007</i>			
Media exposure	Low	44.09	41	55.91	52
	Medium	54.84	85	45.16	70
	High	49.68	77	50.32	78
		<i>Chi2 p value-0.254</i>			
Spousal age gap at the time of marriage	<5 years	49.76	105	50.24	106
	5-9 years	50.00	86	50.00	86
	10 years & above	60.00	12	40.00	8
		<i>Chi2 p value-0.676</i>			
Number of Living Children	1-2 children	52.89	183	47.11	163
	3-4 children	35.09	20	64.91	37
		<i>Chi2 p value-0.013</i>			
Sex of last child	Female	55.09	92	44.91	75
	Male	47.03	111	52.97	125
		<i>Chi2 p value-0.111</i>			
Type of last delivery	Caesarean	42.18	116	57.82	159
	Normal	67.97	87	32.03	41
		<i>Chi2 p value-0.000</i>			
Number of desired children at the time of marriage	1-2 children	50.91	167	49.09	161
	3-4 children	54.55	6	45.45	5
		<i>Chi2 p value-0.813</i>			
Did anyone motivate you to have NSV?	Yes	78.87	153	21.13	41
	No	23.92	50	76.08	159
		<i>Chi2 p value- 0.000</i>			
Awareness of NSV	No Awareness	11.38	14	88.62	109
	Low Awareness	65.04	160	34.96	86
	High Awareness	85.29	29	14.71	5
		<i>Chi2 p value- 0.000</i>			
Has anyone of your male member got sterilized before?	Yes	76.29	74	23.71	23
	No	42.16	129	57.84	177
		<i>Chi2 p value- 0.000</i>			
Total		100.00	203	100.00	200

Determinants of higher acceptance of vasectomy

Table 4 shows the odds ratio in Binary Logistic regression to investigate the connections between vasectomy acceptance

among men in Karimnagar, Warangal, and Hanumakonda districts of Telangana and selected variables related to socio-economic and demographic factors, marriage, family, and sterilization.

Table 4 Logistic Regression of Vasectomy Acceptors and Non-Acceptors

Characteristics	Model 1	Model 2	Model 3	Model 4
	AOR (95 percent CI)	AOR (95 percent CI)	AOR (95 percent CI)	AOR (95 percent CI)
Age (in years)				
23-29®	1.00			1.00
30-34	0.71 (0.28, 1.77)			0.36 (0.06, 2.22)
35-39	1.13 (0.46, 2.83)			0.50 (0.07, 3.63)
40 and above	1.87 (0.68, 5.18)			0.66 (0.07, 6.49)
Religion				
Hindu®	1.00			1.00
Non-Hindu	1.53 (0.54, 4.31)			0.80 (0.16, 3.95)
Caste				
Scheduled Caste®	1.00			1.00
Scheduled Tribe	0.07*** (0.02, 0.24)			0.02*** (0.00, 0.17)
Other Backward Class	0.79 (0.45, 1.36)			0.49 (0.18, 1.32)
None of the above	0.48 (0.13, 1.79)			0.33 (0.03, 3.43)
Household Size				
4 or less®	1.00			1.00
5	0.70 (0.39, 1.28)			1.76 (0.53, 5.90)
6 & More	0.57 (0.30, 1.09)			0.44 (0.15, 1.36)
Type of house				
Pucca®	1.00			1.00
Semi-Pucca/Kachha	1.04 (0.64, 1.70)			0.89 (0.37, 2.13)
Economic Status				
Poor®	1.00			1.00
Middle	1.22 (0.51, 2.92)			0.47 (0.09, 2.38)
Rich	1.68 (0.40, 7.13)			0.53 (0.04, 6.71)
Type of family				
Joint family®	1.00			1.00
Nuclear family	0.79 (0.26, 2.36)			0.42 (0.06, 2.99)
Respondent's education				
No education®	1.00			1.00
Primary and below	1.52 (0.36, 6.44)			0.99 (0.03, 32.63)
Secondary	1.06 (0.33, 3.37)			1.73 (0.12, 24.52)
Higher Secondary	0.66 (0.19, 2.35)			0.47 (0.03, 7.50)
Graduation	0.60 (0.16, 2.29)			0.89 (0.05, 15.88)
Wife's education				
No education®	1.00			1.00
Primary and below	0.50 (0.18, 1.41)			0.52 (0.09, 2.99)
Secondary	1.70 (0.70, 4.18)			1.34 (0.30, 6.06)
Higher Secondary	2.14 (0.78, 5.85)			3.29 (0.62, 17.38)
Graduation	7.03*** (2.26, 21.94)			10.61* (1.47, 20.71)
Respondent's occupation				
Agricultural labourer®	1.00			1.00

Agriculture cultivator	1.20 (0.40, 3.57)	0.78 (0.10, 6.38)
Petty shop	1.67 (0.57, 4.93)	1.36 (0.19, 9.44)
Private/Government employee	0.56 (0.17, 1.85)	0.85 (0.10, 7.28)
Self-employed	2.20 (0.76, 6.35)	3.45 (0.49, 24.46)
Skilled/Unskilled labour	1.05 (0.45, 2.47)	0.94 (0.20, 4.32)
Wife's occupation		
Agricultural labourer®	1.00	1.00
Agriculture cultivator	1.12 (0.40, 3.12)	4.17 (0.55, 31.69)
Petty shop	0.10* (0.02, 0.68)	0.04* (0.00, 0.81)
Housewife	0.96 (0.44, 2.11)	0.94 (0.22, 4.00)
Private/Government employee	4.71 (0.33, 67.90)	10.46 (0.39, 283.11)
Self-employed	1.53 (0.57, 4.06)	2.72 (0.49, 15.00)
Skilled/Unskilled labour	0.39* (0.16, 0.94)	0.19* (0.04, 0.97)
Media exposure		
Low®	1.00	1.00
Medium	1.10 (0.55, 2.18)	0.33 (0.09, 1.20)
High	0.75 (0.35, 1.61)	0.37 (0.08, 1.67)
Spousal age gap at the time of marriage		
Less than 5 years ®	1.00	1.00
5-9 years	1.21 (0.76, 10.93)	1.19 (0.51, 2.79)
10 years & above	1.97 (0.68, 5.69)	0.94 (0.14, 6.41)
Number of Living Children		
1/2 children®	1.00	1.00
3/4 children	0.46* (0.23, 0.90)	0.15** (0.04, 0.62)
Sex of last child		
Female®	1.00	1.00
Male	0.93 (0.59, 1.47)	0.80 (0.34, 1.88)
Type of last delivery		
Caesarean®	1.00	1.00
Normal	2.97*** (1.82, 4.85)	6.41*** (2.57, 15.98)
Number of desired children at the time of marriage		
1/2 children®	1.00	1.00
3/4 children	1.50 (0.42, 5.43)	0.46 (0.06, 3.44)
Did anyone motivate you to have NSV?		
Yes ®	1.00	1.00
No	0.09*** (0.05, 0.16)	0.03*** (0.01, 0.08)
Has anyone of your male family members sterilized before?		
No®	1.00	1.00
Yes	3.76*** (1.91, 7.37)	3.50* (1.24, 9.86)
NSV awareness		
High awareness ®	1.00	1.00
No awareness	0.02*** (0.01, 0.06)	0.01*** (0.00, 0.06)
Low awareness	0.22*** (0.07, 0.67)	0.17** (0.04, 0.72)

Note: ® - Reference category; * $p < 0.05$, ** $p < 0.01$ and *** $p < 0.001$

Model 1 examines the relationship between vasectomy acceptance and socio-economic and demographic variables of respondents without adjusting for other variables. Among these variables, caste, wife's education, and occupation are significantly associated with vasectomy acceptance, with non-acceptance as the reference category. As per **Table 4**, ST respondents are 0.93 times less likely to accept vasectomy than SC respondents. If the respondent's wife is a graduate, the respondent is seven times more likely to accept vasectomy than those with illiterate wives.

Model 2 depicts the relationship between respondents' marriage and family-related variables and vasectomy acceptance, with all other variables remaining unadjusted. Among marriage-related variables, number of living children and type of last delivery are significantly associated with vasectomy acceptance. Individuals with three or more living children are 0.6 times less likely to accept vasectomy than those with just one or two.

Model 3 depicts the relationship between respondents' sterilisation-related variables and vasectomy acceptance, with all other variables remaining unadjusted. Among sterilisation-related variables, motivation, having a sterilised male family member, and knowledge of NSV are significantly associated with vasectomy acceptance.

In comparison to being motivated, the respondent is 0.9 times less likely to accept vasectomy if he is not motivated. A person is 3.7 times more likely to get a vasectomy if there has ever been a sterilised male in the family than not.

The connection between vasectomy acceptability and all the variables adjusted is shown in Model 4. Vasectomy acceptance is

highly connected with caste, the wife's level of education and occupation, number of living children, having sterilised male family member, type of last delivery, motivation, and awareness of NSV. Compared to SC, ST respondents are 0.98 times less likely to approve vasectomy. If the wife is graduate, the husband is 10.6 times more likely to accept vasectomy than respondents with illiterate wives.

Educated couples, especially women, is crucial in making the better choices in family planning. One of the Key Informants, a Media Officer from Warangal District, said -

"In villages, in addition to motivating couples to have family planning, we have to deal with their other members of family too. Because some mothers do not allow their sons to have vasectomy. They insist their daughters-in-law to have tubectomy. Motivating this kind of mothers is more difficult since most of them are illiterates."

Another woman shared her experience, as narrated-

" My husband is the only one who works in the family. I work in the house only. My mother-in-law said that her son works very hard, so t it is better for me to undergo sterilization."

The respondent is 0.97 times less likely to accept the vasectomy if he is not motivated. If a respondent's male family member has ever had a vasectomy, the likelihood of getting vasectomy is 3.5 times higher than if he does not have one.

"The credit for popularizing male sterilization goes to male/female health workers in our district. These health workers are so close to the villagers. People trust them and came forward to get sterilized."-Retired NSV Surgeon, Karimnagar.

A respondent from Karimnagar said how vasectomy was a common practice in his family over the generations:

“My father, now 59 years old, underwent vasectomy. Later, my elder brother has undergone. And last, I accepted vasectomy. Most of my friends accepted vasectomy too. Sterilization for women is more difficult. It is better men undergo vasectomy with three to five days of recovery rather than for women undergoing tubectomy with a recovery period of at least three months. Men feel anxiety and tension before going to operation theatre. And they come out of operation theatre with a smile on their faces. There are no health complications or side effects from vasectomy. Every man who underwent vasectomy in my family is active and does work as they used to do. We all are good.”

Discussions and Conclusions

As in the state of Telangana, with below replacement level of fertility, a high proportion of respondents from the study areas wanted to have a small family, either one or two children. And a large proportion of them have two living children. Based on the findings, it can be concluded that couples are well aware of the advantages of a small family and plan accordingly. The majority of men have reported that the use of family planning should begin only after having two children (Singh, 2007). With technological advancement and the use of electronic gadgets, a sizable proportion of respondents have media exposure. The high level of media exposure helps people in receiving news or information from various sources. In other words, the government can easily spread any information if people have media exposure.

Usually, couples tend to opt for tubectomy if the last delivery is a caesarean section. This is because couples prefer to undergo

sterilization (tubectomy) with the caesarean section itself and do not want to go through another separate operation/surgery afterwards. Among the respondents, including acceptors and non-acceptors of NSV, a notable proportion had caesarean sections. But in contrast to the general belief, among the acceptors, a majority of men opted for vasectomy even though their wives had undergone a caesarean section for the last delivery. In contrast, a considerable proportion of men have allowed their wives to undergo tubectomy even after they had a normal delivery. Men are more aware of the advantages of undergoing vasectomy. The type of delivery influences the choice of sterilization.

The findings highlight that most of the acceptors were motivated by health workers, relatives, friends, or other medical officers to undergo vasectomy. Among the non-acceptors, a major proportion of them did not receive any motivation/advice from any source. In terms of awareness, more than half of non-acceptors have no awareness regarding vasectomy procedures, and a very small proportion of men have a high level of awareness.

It can be seen that the motivation and awareness are not uniform throughout the state, and this disparity also exists within the high-performing districts. The awareness has not yet reached all sections of people. Couples with awareness and motivation are making better decisions in family planning, while many others are still choosing tubectomy due to a lack of proper motivation and the misconceptions about NSV. At the ground level, health workers play an important role in motivating couples and creating awareness about vasectomy.

The study examined the determinants that influence acceptance of vasectomy in the study areas. Among the selected variables, caste, wife's education and occupation, number of living children, type of last delivery, being motivated, having a sterilized male family member, and vasectomy awareness are the key determinants of accepting vasectomy. A study by Valsangkar *et al.* (2012), which attempted to capture the predictors of no-scalpel vasectomy acceptance in Andhra Pradesh, revealed that literacy, duration of marriage, number of living children, role of health workers in motivating couples and the simplicity of the procedure were the key factors for higher acceptance

This study emphasizes the importance of women's education in making better decisions within families. With education, couples make healthier decisions regarding planning families, spacing, number of children, and use of suitable contraceptive methods, along with fostering better inter-spousal communication. According to another study in Andhra Pradesh, female education is one of the factors that explains the force of change on the demographic front in 1990s (James, 1999).

Though a considerable proportion of men opted for vasectomy even after their wives underwent caesarean section, having a normal delivery enhances the chances of choosing vasectomy rather than tubectomy. It is observed in the study that men do not want their wives to undergo another surgery after a normal delivery. Rather, they themselves would like to undergo sterilization without troubling their wives again.

According to our findings, being motivated and aware of vasectomy increases the

likelihood of accepting vasectomy. Apart from the health workers, family members/relatives are one of the key sources/motivators for vasectomy. The findings demonstrated that having a sterilized male family member increases the chances of accepting vasectomy manyfold. It is noticed that, among the acceptors, male sterilization has been happening for generations. Parents share their knowledge and experience with their children and guide them. In such cases, men are more likely to accept vasectomy rather than forcing their wives to undergo tubectomy.

On the other hand, factors that influence and push women to undergo sterilization are largely driven by family dynamics and quality of services provided by health care system. The determinants of female sterilization are shaped by various socio-demographic and contextual factors, including the level of information provided about contraception, age, number of sons and daughters, years of schooling, religion, and place of residence, all of which influence a woman's decision-making process (Jana & Shekhar, 2023; Pradhan *et al.*, 2020). Decision-making power within households plays a crucial role, as male-dominated decisions often compel women to undergo sterilization once perceived family size goals are achieved (Jana & Shekhar, 2023). Women from disadvantaged backgrounds, including those in rural areas, larger households, or with inadequate education and economic means, are less likely to make informed choices (Pradhan *et al.*, 2020).

In many cases, inadequate counselling and provider biases often leave women uninformed about other contraceptive methods, resulting in sterilization without full understanding of its implications (Baveja *et al.*, 2000). Frontline health workers play a

significant role in shaping decisions, often guiding women towards sterilization and, at times, overshadowing alternative options (Salve & Shekhar, 2023). The absence of informed choice is especially troubling when sterilization is undertaken at a young age, as it is frequently associated with post-sterilization health complications (Pradhan & Ram, 2009).

Policy Implications

Based on the study's findings, the government should make more efforts to improve access to education, particularly for women, to enhance awareness and informed family planning choices. Concurrently, investment in targeted media campaigns is essential to disseminate accurate information about vasectomy and reduce associated stigmas. Furthermore, incentives, such as financial support and subsidies for vasectomy procedures, can encourage greater uptake among individuals from diverse socioeconomic backgrounds. Policymakers should also prioritize efforts to promote awareness of No-Scalpel Vasectomy (NSV) and its advantages, alongside investing in healthcare provider training to equip providers with the skills to effectively counsel couples, which can empower individuals and couples to make informed and voluntary family planning decisions. Finally, it is also critical to create an atmosphere through organised health channels where couples may learn about the importance of male involvement in family planning. This includes encouraging satisfied clients to share their experiences with the public, which would result in changing people's perceptions.

Declarations

Funding: No funding source.

Conflict of Interests: No conflict of interest was reported by the authors.

Ethics: The ethical approval of IIPS was obtained before initiating the field work.

References

- Baveja, R., Buckshee, K., Das, K., Das, S. K., Hazra, M. N., Gopalan, S., ... & Saxena, B. N. (2000). Evaluating contraceptive choice through the method-mix approach: An Indian Council of Medical Research (ICMR) Task Force study. *Contraception*, 61(2), 113-119.
- Greene, M. E., & A. E. Biddlecom. (2000). "Absent and problematic men- Demographic accounts of male reproductive roles " *Population and Development Review*, 26(1) SI115.
- International Institute for Population Sciences (IIPS). (1995). National Family Health Survey (MCH and Family Planning), (NFHS-1), 1992-93: India, IIPS, Mumbai.
- International Institute for Population Sciences (IIPS) and ORC Macro. (2000). National Family Health Survey (NFHS-2), 1998-99: India, IIPS, Mumbai.
- International Institute for Population Sciences (IIPS) and Macro International. (2009). National Family Health Survey (NFHS-3), 2005-06: India, IIPS, Mumbai.
- International Institute for Population Sciences (IIPS) and ICF. (2017). National Family Health Survey (NFHS-4), 2015-16: India, IIPS, Mumbai.
- International Institute for Population Sciences (IIPS) and ICF. (2021). National Family Health Survey (NFHS-5), 2019-21: India, IIPS, Mumbai.
- Jain, A. K., & Singh, K. (2010). Acceptance of male sterilization in India: A review. *The Indian Journal of Medical Research*, 132(5), 555-564.
- James, K. S. (1999). Fertility decline in Andhra Pradesh: a search for alternative hypotheses. *Economic and Political Weekly*, 491-499.
- Jana, A., & Shekhar, C (2023). Female sterilisation in India: Examining the role of women's own decision making and information given to

- client. *Journal of Biosocial Science* 55, 960-979.
- Kols, A., & Lande, R. (2008). Vasectomy: Reaching out to new users. *Population Reports. Series D: Male Sterilization*, (6), 1-23.
- Mittal, S., & Bhatnagar, S. (2013). Factors influencing male sterilization acceptance: A review. *Journal of Family Medicine and Primary Care*, 2(2), 153-157.
- MoHFW (2013), *Manual for Male sterilization* (1st ed.). Ministry of Health and Family Welfare, Government of India, New Delhi.
- Murthy, S. R., & Rao, M. D. (2003). An analysis of factors influencing the acceptability of vasectomy in Andhra Pradesh. *Health and Population-Perspectives and Issues*, 26(4), 162-182.
- Pandey, A., & Pandey, S. (2015). Male sterilization in India: An overview. *Indian Journal of Community Medicine*, 40(4), 200-203.
- Pradhan, M. R., Patel, S. K., & Saraf, A. A. (2020). Informed choice in modern contraceptive method use: pattern and predictors among young women in India. *Journal of Biosocial Science*, 52(6), 846-859.
- Pradhan, M. R., & Ram, U. (2009). Female sterilization and ethical issues: the Indian experience. *Social Change*, 39(3), 365-387.
- Salve, P. S., & Shekhar, C. (2023). Disappearing male sterilization in India: do we care?. *Contraception and Reproductive Medicine*, 8(1), 31.
- Singh, A. (2007). *Male Involvement in Family Planning: Evidence from Rural Ahmadnagar, Maharashtra* (Unpublished doctoral dissertation). International Institute for Population Sciences, Mumbai.
- Singh, A., Ram, F., & Ranjan, R. (2006). Couples' reproductive goals in India and their policy relevance. *Social Change*, 36(2), 1-18.
- Srinivasan, K. (2017). *Population Concerns in India: shifting trends, policies, and programs*. SAGE publications, New Delhi.
- Valsangkar, S., Sai, S. K., Bele, S. D., & Bodhare, T. N. (2012). Predictors of no-scalpel vasectomy acceptance in Karimnagar district, Andhra Pradesh. *Indian journal of urology: IJU: journal of the Urological Society of India*, 28(3), 292