ORIGINAL ARTICLE

Predictors of Male Sterilization among Eligible, Modern Method of Family Planning Users in India: Evidence from a Nationwide Survey

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Abstract

Background: Male sterilization despite being more cost-effective compared to female sterilization is opted by very few Indian eligible couple as family planning (FP) method. **Aims & Objectives**: To find out attributes of male sterilization among current eligible modern family planning methods users in India. **Material & Methods**: It was an observational study, cross-sectional in design based on fourth round of national family health survey (NFHS-4) 2015-16 men's datasheet. There were in total 112122 data, of which 11772 sample population who had completed their family, been using modern methods of family planning and wife in reproductive age (15-49) were selected for analysis. **Results**: Among the study subjects, 377(3.2%) underwent male sterilization. In multivariable model those who were residing in southern India; Hindu by religion; scheduled caste (SC)/scheduled tribe (ST) by caste; belonged to lower quintile of wealth index; covered by a health insurance scheme; perceived ≤2 children as ideal number of children; husbands not working and employed seasonally/occasionally were more likely to undergo male sterilization adjusted with the age of husband, wife, their place of residence and property ownership status. **Conclusion**: Male sterilization in the sample population was significantly predicted by the region, religion, ethnicity, socioeconomic status, husbands employment status etc.

Keywords

India; Male; Sterilization, Reproductive; Family Planning Services; Health Surveys.

Introduction

Vasectomy is a safe and highly effective contraceptive method for couples who want to stop childbearing, but only 2.4% of men around the world use this method. (1) There is a wide variation of using vasectomy as a family planning (FP) measure across the world. In developed countries, it ranges from 8-22% while in the least developed countries, it is as low as 0%. (2) India, with 1.24 billion population, is the second-most populous country of the world. It is home for one-fifth of the world's protected couples and eligible couples with unmet need. Therefore, the large population size of India impacts not only its own but also the global health indicators. (3,4)

No scalpel vasectomy (NSV) is a modified and sophisticated technique of vasectomy that requires no incision but only a small puncture and no stitches. The acceptor can walk back home within 30 minutes after the procedure and recover much faster with almost negligible post-procedure discomfort or complications. NSV is a less expensive operation than tubectomy in terms of instruments, hospitalization, and doctor's training. Cost-wise, the ratio is about five vasectomies to one tubal ligation. It was introduced in India in 1992 to increase male participation in FP. Nevertheless, over the years, it had failed to achieve its goal. (5,6,7,8)

Contraception is a shared responsibility of both men and women, but over the years, FP programmes are being mostly targeted towards women ignoring men which is wrong. (9) As per existing literature, the attributes of acceptance of male sterilization were found to be the age of both husband and wife, their educational level,

socioeconomic status, region/state they belong to, religious belief, ethnicity etc. (10-17) Whereas barriers of NSV were found to be lack of information, religious prohibition, perceived negative impact of NSV on a man's health, concern regarding the safety of NSV, social stigma, uncertainty regarding the future desire for children etc. (18,19)

Although the prevalence of using modern methods among currently married women of the reproductive age group in India slightly increased in NFHS-4 (51.2%) compared to NFHS-3 (48.5%), male sterilization declined from 1.0% in NFHS -3 to merely 0.3 % in NFHS-4. (5,6) Those who were using modern FP methods and completed their family, acceptance of male sterilization is expected to remarkably low in comparison of female sterilization as overall it is low. Understanding of attributes of male sterilization among modern FP methods users is important as it may be considered as a missed opportunity to counsel these eligible couples for male sterilization despite being more cost-effective compared to female sterilization. There is limited evidence on attributes of acceptance of male sterilization among current modern FP methods users in India.

Aims & Objectives

To find out attributes of male sterilization among current eligible modern family planning method users in India.

Material & Methods

Study Type: It was an observational study, cross-sectional in design.

Study Population: The study used data from the fourth round of the Indian National Family Health Survey (NFHS-4) 2015–16. The NFHS is a household survey which is nationally representative that provides a wide range of data for monitoring and evaluation of indicators in the key areas of population health. It is a stratified two-stage sample with an overall response rate of 98%. For analysis, men's datasheet of NFHS-4 was used. There were in total of 112122 data in men's datasheet of NFHS-4. The analysis was conducted among current eligible modern FP methods users. Here, current eligible modern FP users are those who satisfy following conditions: 1) reported to wish no child or partner sterilized (n=49458) 2) had wives in the reproductive age group (15-49) (n=48195) and 3) using modern methods of family planning (n=11772). These 11772 samples were used for final analysis.

Outcome Variable: It was male sterilization (yes, no) among current eligible modern family planning method users.

Attributable Variables: The attributes used in the analysis were the region of residence(central, western, eastern, northern, southern, north-eastern); the age of husband; the age of wife; the educational level of husband (in completed years of education) (no education/primary/middle/higher); place of residence (rural, urban); religion(Hindu, Muslim, Buddhist, Sikh, others); ethnicity [scheduled caste (SC); scheduled tribe (ST); other backward class (OBC); Others]; sex of head of household (female, male); wealth index (poorest, poorer, middle, richer, richest); talked with health worker regarding contraception in past few months (yes, no); exposure to family planning messages in last few months (TV/radio/newspapers/wall paintings) (yes, no); health insurance coverage status (yes, no); perceived ideal number of total children (≤2/>2); husband justified domestic violence (no, yes) (if wife disrespectful or unfaithful); husbands working status(yes, no); employment type(all year, seasonal, occasional); wife's working status(yes, no) and ownership of a property (no, yes) (house or land).

Ethical Approval: The study was based on secondary data of national family health survey; therefore, it was exempted for ethical clearance by the institutional ethical committee of All India Institute of Medical Sciences (AIIMS); Patna. Permission of data archivist of The Demographic and Health Surveys (DHS) Program was taken for access and use of NFHS-4 data for the study. The study was conducted as per the Declaration of Helsinki. Informed written consent of the study participants could not be taken because the study was a secondary anonymous data analysis.

Statistical Analysis: Data were analyzed using IBM SPSS (Chicago, USA) (version 16). At first, bivariate analysis was performed using the chi-square test in between attributable variables and outcome variable to find out associates of male sterilization. This was followed by bivariate logistic regression analysis to find out the strength of the association between male sterilization and its attributes. Finally, statistically associated variables in bivariate analysis were entered into the multivariable logistic regression model to find out multivariable predictors of male sterilization. The minimum acceptable confidence level was $\alpha = 0.95$ for all statistics, and the maximum acceptable significance level was $P < 0.05$.

Results

Out of 11772 current eligible modern family planning method users, 377(3.2%) had undergone male sterilization. All of them were currently married. The mean age of husbands and wives in the sample population were 40.2 (range:20-54) and 35.3 (range: 16-49) years, respectively. Mean years of education of husband was 4.1 (range:0-20) years. The sources of different family planning messages were radio (19.6%), television (64.6%), wall paintings (62.3%) and newspaper (48.6%). More than one-tenth (11.6%) and 11.1% of them were covered by state health insurance schemes (SHIS) and Rashtriya Swasthya Bima Yojana (RSBY) respectively. The stated reasons for justifying domestic violence were wife unfaithful (17.4%) and disrespectful (22.3%). In bivariate analysis region of residence, age of husband, age of wife, place of residence, religion, ethnicity, wealth index, health

insurance coverage status, perceived ideal number of total children, husbands working status, employment type and property ownership status were associated with male sterilization. (Table 1)

In multivariable model those who were residing in southern India; Hindu by religion; SC/ST by caste; belonged to lower quintile of wealth index; covered by a health insurance scheme; perceived ≤2 children as the ideal number of children; husbands not working and employed seasonally/occasionally were more likely to undergo male sterilization adjusted with the age of husband, wife, their place of residence and property ownership status. Notably, residence in central India despite having higher odds for male sterilization compared to eastern India in bivariate analysis got attenuated in the multivariable model and became protective for it. Overall, the model predicted a 5.9% variability of the outcome variable with predictive accuracy rate (PAR) of 96.8% while Hosmer Lemeshow test p-value of .163 indicated model fit. (Table 2)

Among 377 male sterilization operation, 95.2% took place in the public health care facilities. Majority of them 310(82.2%) had undergone sterilization free of cost. Overall, the median duration since sterilization was 10 (IQR:6-16; range: 0-41) years. Those who have paid for sterilization have paid median value of 1500 (interquartile range IQR: 500-4625; range: 2-40000) rupees. Four-fifth of them 290(76.9%) had received compensation for undergoing sterilization with the median amount of compensation of 600 (IQR:300-1100; Range: 10-5500) rupees. One-twentieth of them 21(5.6%) regretted for undergoing sterilization. Notably, more than one-third 128 (34%) of them were covered by a health insurance scheme. (Figure 1) and (Figure 2)

Discussion

It was an observational study, cross-sectional in design based on NFHS-4 men's datasheet among current eligible modern family planning methods users to find out attributes of acceptance of male sterilization among them.

In the present study age of both husband and wife emerged as associates of male sterilization among the sample population in bivariate analysis. This was in concordance with the findings of a south Indian (10) and a study based on USAs National Survey for Family Growth (NSFG) data. (11) Other studies around the world also reported the same. (12,13,14) Educational level of both the partners plays a crucial role in the decision of male sterilization as reported by a south Indian (10) and other studies around the world. (12,13,14,15,16) We did not find such an association between educational level and male sterilization. This may be because, we have only enrolled those who were using modern methods of family planning in our sample. They are likely to be more educated compared to others who were not enrolled.

Concerning region, it emerged as an attribute of male sterilization among the selected sample population. This was in concordance with a study conducted in the USA by Lamberts et al. (13) In the present study, those who were residing in southern India had 1.7 times higher odds of accepting male sterilization compared to those residing in the eastern part of the country. Eastern India comprises of states like Bihar, Jharkhand, Odisha and West Bengal. In these states met need for contraception among eligible couples by modern methods is projected to be less than 75% even by 2030 based on current trends as reported by New et al. (20). This was unlike southern states of India which are projected to achieve and surplus 75% coverage of modern contraceptive methods among eligible couples by 2030 in the same study. The possible reason could be a higher educational level, contraceptive knowledge among eligible couples residing in southern India compared to the eastern part of the country.

Concerning religion, Hindus were more likely to undergo male sterilization compared to others. In the sample population, Islam was the second most common religion after Hindu. Among Muslim men, only 1.8% underwent male sterilization which was quite low compared to Hindus (3.5%). It was in concordance with a study in Rwanda by Ntakirutimana et al. (15) which reported that Catholics [OR:3.7(1.8-4.2)] and Protestants [OR:5.4(4.4-8.5)] are more likely to accept vasectomy compared to Muslim men. Whereas, the study in Borno by Aji et al. (17) reported that the attitude of married Muslim men towards family planning is mainly negative because they believe that Islam is against FP. Similar findings were also documented in a north Indian study conducted by Shafi et al. (19) in Lucknow city where 6.4% of the study participants reported prohibition in religion as a barrier of NSV which supports our findings. Similarly, ethnicity emerged as an associate of male sterilization. Two different American studies by Lamberts et al. (13) and Anderson et al. (14) respectively found an association between race/ethnicity and male sterilization utilization which was in concordance with our findings.

Those who belonged to lower socioeconomic status were more likely to undergo a vasectomy. This was dissimilar with the findings of three American (11,13,14) and a Chinese study by Chang et al. (16) which reported higher income as an associate of vasectomy. A south Indian study by Valsangkar et al. (10) did not find this association. Considering health insurance coverage, those who were covered by health insurance were more likely to accept male sterilization compared to others. Similarly, husbands working status and employment type emerged as a significant attribute of male sterilization. A study in Cameroon by Egbe et al. (12) did not find this association. It may be due to geographical plausibility and small sample size of Egbe et al. (12) compared to us. In India government pays beneficiaries of NSV to encourage its acceptance. This may be why those who were not working

and employed seasonally/ occasionally were more likely to accept male sterilization compared to others. In India, SCs and STs are likely to be economically more deprived than other castes. (21) We think that those who belonged to SC/ST caste, lower quintile of wealth index, not working and employed seasonally/occasionally were more likely to undergo male sterilization in the present study compared to others mainly due to compensation offered by the government. This is quite worrisome as acceptance of contraception should be completely voluntary, and it should not be affected by monetary offerings.

In the present study, there was no association between exposure to family planning messages and acceptance of male sterilization. This was dissimilar with the findings of the studies in three countries of Africa and Senegal by Okigbo et al. (22) and Speizer et al. (23) respectively which reported exposure to family planning messages as an attribute of modern family planning methods acceptance and use. Additionally, the analysis was performed on all modern method users who are likely to more informed compared to others. Considering the perceived number of children, those who had reported perceived number of children ≤2 had 1.7 times higher odds of accepting male sterilization which was discordant with the findings of the Cameroon study (12) which did not find this association.

In strengths, it was by far the study with the largest sample size, which investigated attributes of acceptance of male sterilization among current eligible modern FP method users in India. It additionally used regression analysis to quantify the strength of association between male sterilization and its various attributes. This may help policymakers in prioritizing interventions to increase acceptance of male sterilization in the country.

Conclusion

Male sterilization in the sample population was significantly predicted by region of residence, religion, ethnicity, socioeconomic status, perceived number of children, health insurance coverage status, husbands working status and employment type.

Recommendation

Further in-depth research in this regard is warranted to acquire more knowledge on the issue and design interventions to improve the acceptance of male sterilization among current eligible modern family planning users.

Limitation of the study

In limitations, independent variables in the multivariable logistic regression model only predicted 5.9% variability of the outcome variable which indicates a need of future research in this issue as there may be certain other factors (i.e. knowledge regarding vasectomy, perceived barriers of vasectomy etc.) influencing acceptance of male sterilization among the target population. In the present study, the median time since the event (male sterilization) was quite long (10years). Thus, the influence of certain factors (i.e. migration over a period of time) in the overall results cannot be ruled out.

Relevance of the study

The study found that mainly poor and deprived people in the country were the beneficiaries of male sterilization, which may be due to the compensation provided by the government. The government should create awareness regarding male sterilization to generate demand for it in the community irrespective of their deprivation status.

Authors Contribution

BB conceptualized, designed and drafted the manuscript. AK did the statistical analysis. NA helped interpret the data and revised the manuscript.

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Tables

TABLE 1 BACKGROUND CHARACTERISTICS OF THE CURRENT ELIGIBLE MODERN METHOD USERS AS PER THEIR MALE STERILIZATION STATUS: N=11772

Variables	Male Sterilization Yes Mean±SD/N(%)	Total Mean±SD/N(%)	p value§
Region of residence:			
Central	66(3.4)	1927(16.4)	.000
Western	45(3.1)	1463(12.4)	
Eastern	23(1.4)	1624(13.8)	
Northern	159(3.7)	4243(36.0)	
Southern	56(4.2)	1334(11.3)	
North-eastern	28(2.4)	1181(10.0)	
Age of husband in completed years:			
20-29	16(2.0)	816(6.9)	.010
30-39	131(2.9)	4535(38.5)	
40-49	169(3.4)	4993(42.4)	
≥50	61(4.3)	1428(12.1)	
Age of wife in completed years:			
20-29	62(2.5)	2487(21.1)	.000
30-39	159(2.8)	5649(48.0)	
40-49	156(4.3)	3636(30.9)	
Educational level of husband:			
No education	66(3.2)	2032(17.3)	.751
Primary	69(3.4)	2010(17.1)	
Middle	200(3.2)	6222(52.9)	
Higher	42(2.8)	1508(12.8)	
Place of residence:			
Rural	298(3.6)	8198(69.6)	.000
Urban	79(2.2)	3574(30.4)	
Religion:			
Hindu	318(3.5)	9188(78.0)	.000

Muslim	23(1.8)	1306(11.1)	
Buddhist	24(11.1)	217(1.8)	
Sikh	6(1.1)	535(4.5)	
Others	6(1.1)	526(4.5)	
Ethnicity:			
SC*	68(3.0)	2253(19.1)	.000
ST†	105(5.9)	1775(15.1)	
OBC‡	97(2.2)	4326(36.7)	
Others	107(3.1)	3418(29.0)	
Sex of the head of household:			
Female	23(4.2)	550(4.7)	.182
Male	354(3.2)	11222(95.3)	
Wealth index:			
Poorest	58(3.7)	1580(13.4)	.000
Poorer	69(2.9)	2354(20.0)	
Middle	104(4.0)	2576(21.9)	
Richer	91(3.7)	2490(21.2)	
Richest	55(2.0)	2772(23.5)	
Talked with health worker regarding contraception in the past few months:			
Yes	99(3.2)	3106(26.4)	.955
No	278(3.2)	8666(73.6)	
Exposure to family planning messages in the last few months:			
Yes	296(3.2)	9262(78.7)	.937
No	81(3.2)	2510(21.3)	
Covered by health insurance:			
Yes	128(4.1)	3148(26.7)	.001
No	249(2.9)	8624(73.3)	
Perceived ideal number of children:			
≤2	286(3.5)	8147(69.2)	.004
>2	91(2.5)	3625(30.8)	
Husband Justified domestic violence:			
No	278(3.3)	8514(72.3)	.532
Yes	99(3.0)	3258(27.7)	
Husband currently working:			
No	41(5.9)	692(5.9)	.000
Yes	336(3.0)	11080(94.1)	
Husbands type of employment:			
Seasonal	96(4.7)	2050(17.7)	.000
Occasional	9(6.8)	133(1.1)	
All Year	261(2.8)	9394(81.1)	
Wife currently working:			
Yes	73(3.3)	2230(18.9)	.832
No	304(3.2)	9542(81.1)	
Owns a property (house/land):			
No	244(3.5)	6928(58.9)	.019
Yes	133(2.7)	4844(41.1)	

*scheduled caste, †scheduled tribe, ‡other backward caste, §chi-square test

TABLE 2 UNIVARIATE AND MULTIVARIABLE LOGISTIC REGRESSION ANALYSIS SHOWING PREDICTORS OF MALE STERILIZATION AMONG CURRENT ELIGIBLE MODERN METHOD USERS: N=11772

Variables	Male Sterilization: Yes=377(3.2%) Mean±SD/N(%)	OR[§] (95%CI[||])	AOR[¶] (95%CI[||])
Region of residence:			
Central	66(3.4)	2.47(1.53-3.98)	0.44(0.24-0.78)
Western	45(3.1)	2.20(1.33-3.66)	1.15(0.72-1.86)
Northern	159(3.7)	2.71(1.74-4.21)	1.28(0.77-2.10)
Southern	56(4.2)	3.05(1.86-4.98)	1.73(1.12-2.65)
North-eastern	28(2.4)	1.69(0.97-2.95)	1.62(0.99-2.64)
Eastern	23(1.4)	Ref.	Ref.
Age of husband in completed years: (increasing)	41.5±7.3	1.03(1.01-1.04)	1.01(0.98-1.04)
Age of wife in completed years: (increasing)	36.9±6.8	1.03(1.02-1.05)	1.02(0.99-1.06)
Place of residence:			
Rural	298(3.6)	1.66(1.29-2.14)	1.24(0.93-1.66)
Urban	79(2.2)	Ref.	Ref.
Religion:			
Hindu	318(3.5)	1.53(1.15-2.03)	1.41(1.04-1.91)
Others	59(2.3)	Ref.	Ref.
Ethnicity:			
SC[*]/ST[†]	173(4.3)	1.65(1.35-2.03)	1.59(1.27-1.98)
OBC[‡]/Others	204(2.6)	Ref.	Ref.
Wealth index:			
Poorest	58(3.7)	1.88(1.29-2.73)	1.85(1.17-2.90)
Poorer	69(2.9)	1.49(1.04-2.13)	1.41(0.93-2.12)
Middle	104(4.0)	2.07(1.49-2.89)	1.93(1.34-2.78)
Richer	91(3.7)	1.87(1.33-2.63)	1.82(1.28-2.59)
Richest	55(2.0)	Ref.	Ref.
Covered by health insurance:			
Yes	128(4.1)	1.42(1.14-1.77)	1.29(1.03-1.61)
No	249(2.9)	Ref.	Ref.
Perceived ideal number of children:			
≤2	286(3.5)	1.41(1.11-1.79)	1.77(1.37-2.28)
>2	91(2.5)	Ref.	Ref.
Husband currently working:			
No	41(5.9)	2.01(1.44-2.81)	1.60(1.12-2.30)
Yes	336(3.0)	Ref.	Ref.
Husbands type of employment:			
Seasonal/Occasional	116(4.9)	1.79(1.43-2.24)	1.53(1.19-1.96)
All Year	261(2.8)	Ref.	Ref.
Owns a property (house/land):			
No	244(3.5)	1.29(1.04-1.60)	1.14(0.92-1.43)
Yes	133(2.7)	Ref.	Ref.

[*]scheduled caste, [†]scheduled tribe, [‡]other backward caste, [§]odds ratio, [||]confidence interval, [¶]adjusted odds ratio

Figures

FIGURE 1 DISTRIBUTION OF MALE STERILIZATION BENEFICIARIES AS PER PLACE OF STERILIZATION: N=377

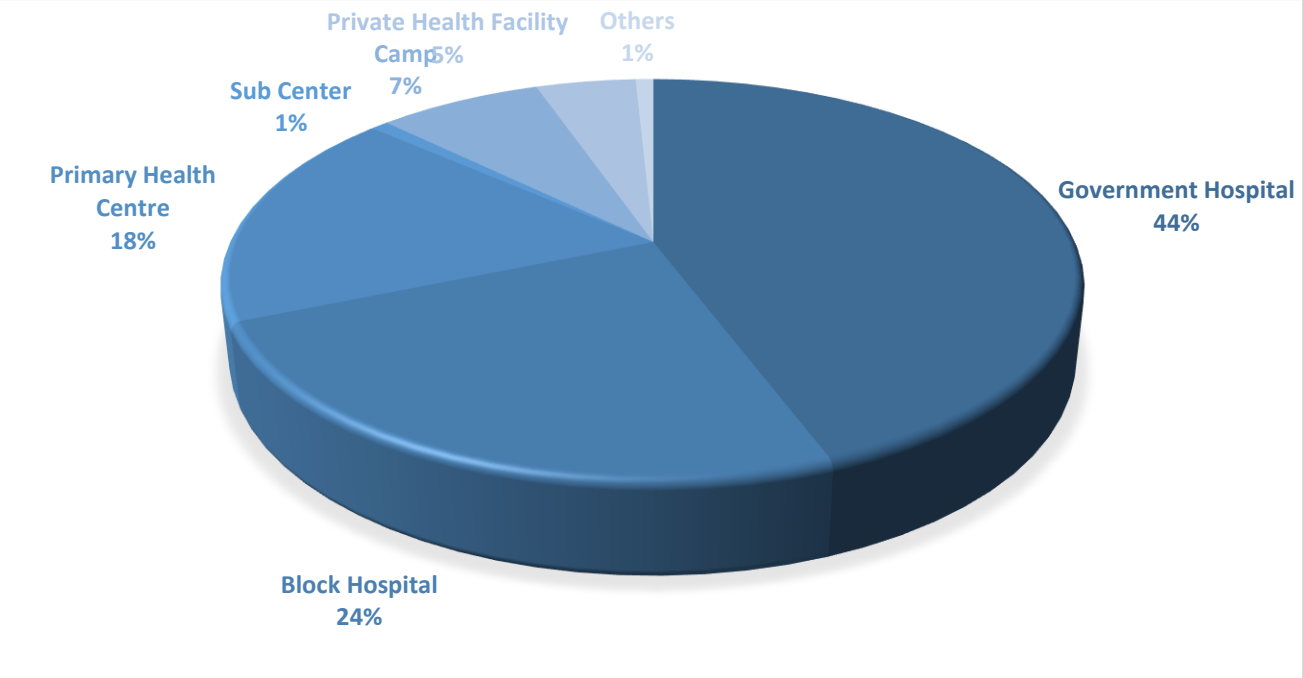
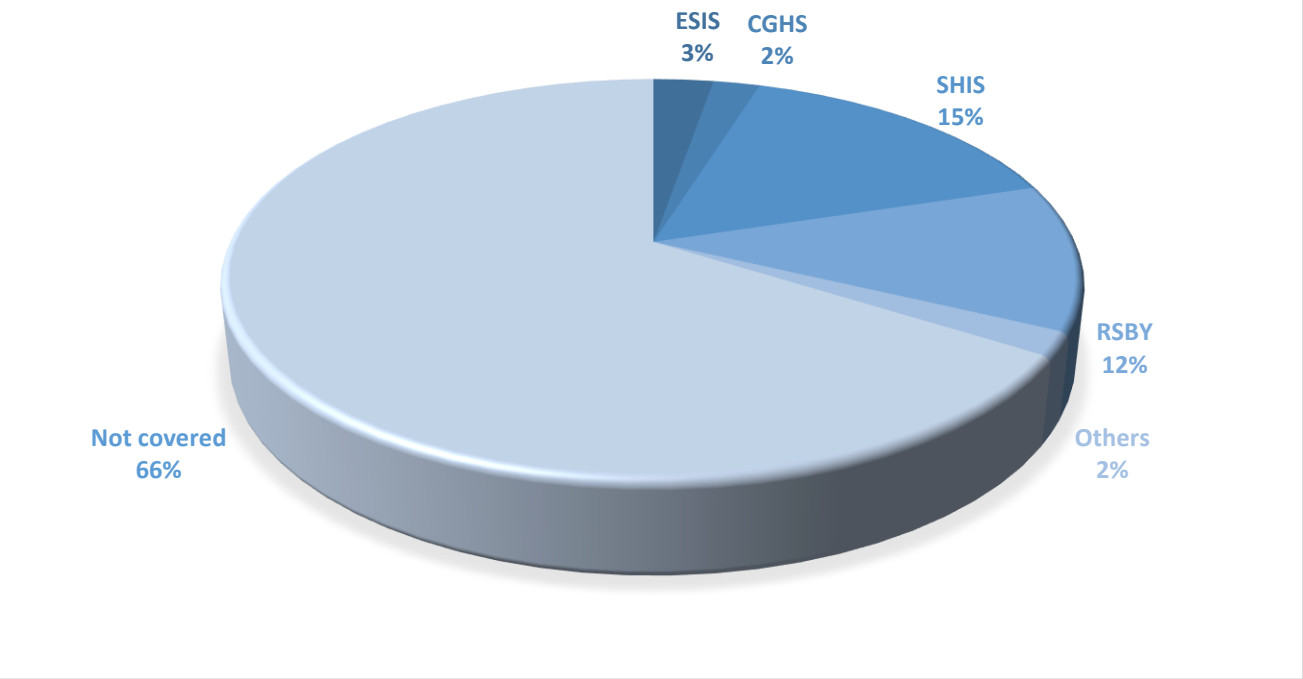


FIGURE 2 DISTRIBUTION OF MALE STERILIZATION BENEFICIARIES AS PER THEIR HEALTH INSURANCE COVERAGE STATUS AND TYPE OF COVERING HEALTH INSURANCE SCHEME: N=377



ESIS: Employment State Insurance Scheme; CGHS: Central Government Health Scheme;
SHIS: State Health Insurance Scheme; RSBY: Rashtriya Swasthya Bima Yojana