Family Planning Perspectives
Volume 27, Number 3, May/June 1995

Sterilization Among Currently Married Men in the United States, 1991

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Data from the 1991 National Survey of Men indicate that about 12% of married men aged 20-39 have had a vasectomy and about 13% are married to a woman who is sterilized. Multivariate analyses indicate that the likelihood of sterilization rises with husband's age, wife's age, duration of marriage and number of children. Black couples are significantly less likely than white couples to rely on sterilization, and interracial couples are less likely than same-race couples to be sterilized. The likelihood of reliance on vasectomy rather than tubal ligation also rises with husband's age, while black men are significantly less likely than white men to elect male over female sterilization. Use of male sterilization is strongly associated with having had a recent contraceptive failure while using a male method.

(Family Planning Perspectives, **27:**100-107 & 122, 1995)

As a means of fertility control, vasectomy not only is highly effective, but also is less costly and complicated than tubal ligation and has fewer long-term health risks. [1] Yet U.S. men are less likely than women to seek sterilization. Between 1982 and 1988, while the prevalence of female contraceptive sterilization in the United States rose from 23% to 28% of contraceptive users aged 15-44, there was no significant increase in the prevalence of male sterilization. [2] Data from the 1988 National Survey of Family Growth, a representative sample of women aged 15-44, showed that 12% of contraceptive users relied on male sterilization. Why men are less likely than women to undergo sterilization deserves further attention.

Current research on the antecedents of contraceptive sterilization has focused mostly on individuals' social and demographic characteristics. Results from various studies show that men generally are in their middle-to-late 30s when they seek sterilization , [3] and that men who have not completed high school are less likely to have a vasectomy than are men with at least a high school education. [4] Wife's education has also been found to increase the likelihood that a husband will obtain a vasectomy. [5] Race and ethnicity appear to have a large effect: Studies have consistently found that both black and Latino men are less likely than white men to choose sterilization. [6] Among black and Mexican American couples who elect sterilization, the likelihood is that a female procedure will be chosen. [7]

Studies focusing on the effect of religion on the decision to seek male sterilization

indicate that Protestants are more likely to seek the procedure than are either Catholics or those with other religious affiliations. [8] Some community-level impact on the sterilization decision is indicated by the empirical association found between region of residence and the likelihood of vasectomy: Not only are couples who live in the western United States more likely to have chosen sterilization than are those living in other regions, but they are also more likely to have chosen vasectomy over female sterilization. [9]

Previous research has also shown that sterilization is a joint decision in which both husbands and wives participate, [10] and that the spouse most motivated to stop childbearing is the one most likely to become sterilized. [11] Couples with open communication regarding birth control are more likely to choose vasectomy than are couples where the wife appears to have assumed the burden of contraception. Miller and colleagues have concluded that couples who choose vasectomy are probably less traditional and more egalitarian in their marital roles than are couples who do not. [12] Another study, based on combined national surveys of married women, has suggested that couples who have dissimilar characteristics are more likely to be liberal and to be social innovators than are couples made up of individuals who are more alike, and therefore will be more likely to practice sterilization and choose male sterilization over female sterilization. [13] Results supported the hypothesis that the two types of couples differ in their tendency to choose sterilization, but they found no relationship regarding the selection of male sterilization over female sterilization.

Finally, based on in-depth interviews with couples and single men, Mumford delineated a series of events that make up the vasectomy decision process; he identified a "scare"—a missed period or severe side effects from the pill—as an important factor. [14] About one-half of the sterilized men he interviewed had experienced a prior contraceptive scare.

Family planning research has to a large extent neglected the role of men in contraceptive decision-making. Research on sterilization in general, and on the choice of male sterilization in particular, has been based largely on survey data collected from women Our research explores the factors associated with contraceptive sterilization using data reported by men in a national survey. We limit the sample to currently married men and examine factors influencing both the choice of contraceptive sterilization and then the choice of vasectomy over tubal ligation among married couples. The analysis focuses on the effects of both individual and couple characteristics on the sterilization decision.

METHODOLOGY

Our analysis is guided by a social-demographic model of contraceptive behavior. Briefly, this framework posits that the motivation to avoid a pregnancy is determined by the relative costs and benefits of a pregnancy to an individual or a couple. The cost-benefit calculus is based on past and current social and economic, sexual and reproductive, interpersonal and contextual characteristics. [15] These factors affect contraceptive decision-making and method selection through a set of unmeasured intervening variables, including the motivation to avoid pregnancy, the utility and disutility of using contraceptives, and the costs and benefits of using specific methods. We have included in our models social and demographic characteristics of the husband

and wife (such as age, education, race and religion), dyadic factors (such as marital duration, number of pregnancies, number of children, intention status of the last pregnancy and—if the pregnancy was unintended—contraceptive practice at the time) and measures of partners' individual characteristics relative to their spouses.

DATA

We draw on data from the 1991 National Survey of Men, which was based on a stratified, clustered area probability sample of households in the contiguous United States. The response rate was 70%. The total sample included 3,321 men who were 20-39 years of age at the time of the survey. Black households were oversampled to allow for adequate representation in race and ethnicity comparisons. The final sample was weighted on the basis of population statistics to account for the effects of stratification, clustering and disproportionate sampling and for the effects of differential nonresponse, thereby allowing us to generalize to the U.S. population of men aged 20-39. A detailed description of the survey design and methodology has been reported elsewhere. [16] Since the analyses reported here involve the characteristics of both husbands and wives, the sample was restricted to 1,671 currently married men who were not contraceptively sterilized before their current marriage. [*]

MEASURES

In the first-stage analysis of factors associated with the sterilization decision, our dependent variable was a dichotomy indicating sterilization vs. no sterilization, with the latter category including use of contraceptive methods other than sterilization as well as use of no method. [**] In the analysis of the choice of male sterilization, the dependent variable was a trichotomous variable indicating no sterilization, male sterilization or female sterilization. The three-category dependent variable provided contrasts for the effects of the independent variables on choosing male sterilization vs. all else (including no method, but not female sterilization), female sterilization vs. all else (including no method, but not including male sterilization), and male sterilization vs. female sterilization. Only the results for the last contrast are reported in this article.

Explanatory variables, chosen on the basis of the conceptual framework and on empirical results from previous research, indicate that individual characteristics such as age, race, education, religion and residence influence men's choice of vasectomy. Because the sample consisted of relatively young men under 40, we expected modest but positive age effects on the choice of sterilization, especially on the choice of vasectomy. Three dummy variables (white, black and other) were used to indicate husband's race. We posited that nonwhite men would be less likely than others to choose vasectomy.

Education was included as a measure of socioeconomic status. Because previous research has indicated that the completion of high school has the strongest effect on the choice of vasectomy (compared with not completing high school), [17] we included a three-category measure of educational attainment—less than high school, high school graduate (or equivalent), and college or higher education—rather than represent education as a continuous variable. Four categories indicated the husband's religious affiliation: Protestant, Catholic, other religion and no religious affiliation. Research suggests that Catholics are less likely to elect vasectomy than are Protestants, and we

expected a similar result. [18] Finally, we used the four U.S. census regions as the residence variable. We expected the likelihood of vasectomy to be higher among men who live in the West than among those who live in the South, the Midwest or the Northeast.

Guided by previous research, [19] we also explored the effect of the relative characteristics of the partners—in terms of age, race, education, religion and previous marital experience—on the choice of sterilization. † Because their marital choices would be considered less traditional, we expected that dissimilar couples would be the most likely both to choose sterilization and to choose vasectomy. Based on the three race categories (white, black and other), we coded couples as racially similar if the partners were in the same category. Marital history had four categories: neither partner married before; husband married before; wife married before; and both married before. We posited that prior marital experience would increase the likelihood of sterilization, and that the partner who had been married before would be more likely to be sterilized than the partner who had not been marriedbefore.

Educational attainment was divided into three categories (did not complete high school, graduated from high school or had any post-high school education) and was expressed as husband and wife with the same level of education, wife with a higher level, or husband with a higher level. The relative effect of religion was based on the congruence of the partners' religious affiliations—Protestant, Catholic, other religion and no religion. Finally, the wife and husband were considered similar in age if they were fewer than three years apart; the remaining two categories indicated whether the wife was three or more years older than her husband or whether the husband was three or more years older than his wife. ‡

Contraceptive and fertility experience included measures of childbearing patterns, such as the number of pregnancies that the couple had experienced (with each other) by the date of the interview, the number of children that the couple had (including stepchildren and adopted children), § and a composite measure of whether or not the last pregnancy was intended, coupled with contraceptive use status and method choice at the time. We divided intention status of last pregnancy into five categories: intended; unintended and a female method §* was used; unintended and a male method §**; was used; unintended and no method was used; and no pregnancy in this marriage.

Based on the literature, we expected that couples who had had a contraceptive failure would be the most likely to seek sterilization. We further hypothesized that if a female method was being used at the time of the last pregnancy, then the couple would be more likely to choose female sterilization, but that if a male method was being used, then the couple would be more likely to choose vasectomy. We also anticipated that higher parity and longer marriage duration would increase the likelihood of vasectomy.

ANALYSIS

In the first-stage analyses, we used logistic regression to examine the effect of individuals' characteristics and partners' relative characteristics on the decision to choose contraceptive sterilization over all other contraceptive methods or no

contraceptive method. The beta coefficients obtained from the logistic regression equation represented reductions or increases in the log odds of the conditional probability of choosing sterilization, relative to the reference category. We obtained metric odds for coefficients by taking the exponential of the coefficient (Exp^{b}).[20]

In the second-stage analyses, we used multinomial logistic regression to examine the factors associated with the likelihood of choosing male sterilization over female sterilization. The multinomial logit model is a direct extension of the dichotomous logistic regression model. The equations express the log of the odds of one outcome versus another as a linear function of a set of explanatory variables. In this model, regression coefficients were obtained for three contrasting situations. The coefficients in the first two situations represented the change in the log odds of choosing vasectomy over all other methods and the change in the log odds of choosing female sterilization over all other methods that could be attributed to a unit or category change in a predictor variable. The coefficients in the third situation represented the change in the log odds of choosing male sterilization vs. female sterilization that was associated with a unit change in a predictor variable or with being in a given category of the predictor variable relative to being in the reference category. Only the last of these contrasts is presented in this article. The binomial logistic regression models were estimated using SPSS; the multinomial equations were estimated with the software program LIMDEP.

FINDINGS

The sample of respondents was relatively young, with a mean age of 32.1 years. Thus, the results reported here reflect the choice of vasectomy by relatively young people. The distributions of individual characteristics, relative characteristics of the partners and contraceptive and fertility measures, shown in Table 1, indicate that 56% of couples were within three years of age of each other, while in 33%, the husband was three or more years older than his wife. Interracial marriages were relatively rare, with a little more than 8% of couples being of different races. About 76% of marriages were first marriages for both partners. More than 60% of couples had a similar level of education; in almost one-half of the remaining couples, men had a higher level of education than their wives. Twenty-three percent of men were married to someone of a different religious background.

Table 1. Percentage distribution of currently married 20-39-year-old U.S. men, by characteristics, National Survey of Men, 1991

Characteristic	Unweighted N	Weighted %
TOTAL	1,671	100.0
HUSBAND'S CHARACTERISTICS		
Age		
20-24	131	8.3
25-29	342	22.0
30-34	554	33.6
35-39	644	36.2
Race		
White	992	78.5
Black	501	8.9

Other	177	12.6
Education		
<high school	158	9.9
High school	640	43.9
>high school	873	46.2
Religion		
Protestant	1,046	53.2
Catholic	404	32.6
Other	68	3.8
None	153	10.4
Region of residence		
Northeast	247	20.8
South	754	28.6
Midwest	413	30.0
West	257	20.6
WIFE'S CHARACTERISTICS		
Age		
20-24	221	14.7
25-29	446	25.5
30-34	549	33.1
>=35	455	26.7
Race		
White	1,007	78.2
Black	476	8.6
Other	188	13.1
Education		
<high school	162	9.8
High school	660	43.3
>high school	849	46.9
Religion		
Protestant	1,063	54.1
Catholic	411	33.0
Other	88	5.5
None	109	7.3
TOTAL	1,671	100.0
SPOUSES' RELATIVE CHARACTERISTICS		
Age		
Same age *	884	56.2
Wife older †	184	10.9
Husband older †	585	32.9
Race		
Same race	1,534	91.5
Different races	137	8.5
Previous marriage		
Neither	1,237	75.5
Husband only	152	8.3
Wife only	176	10.4

Both	106	5.8
Education		
Same level	1,030	61.8
Wife more	307	19.8
Husband more	328	18.4
Religion		
Same religion	1,309	76.9
Different religions	345	23.1
COUPLE CHARACTERISTICS		
Duration of marriage		
¾3 years	560	31.8
4-7 years	413	23.6
8-11 years	322	20.4
>=12 years	376	24.2
No. of pregnancies		
0-1	746	44.0
2	496	29.9
>=3	429	26.2
No. of children		
0-1	650	42.1
2	546	31.5
>=3	475	26.4
Status of last pregnancy		
Intended	799	53.8
Unintended, female		
method used	118	5.5
Unintended, male		
method used	74	4.0
Unintended, no		
method used	291	15.4
No pregnancy		
in this marriage	364	21.3
*Within three years. †By three or more years		

For about 25% of couples, their most recent pregnancy had been unintended; 10% had been practicing contraception and 15% had not. At the time of the interview, couples had an average of 1.8 children (including children from previous marriages and foster or adopted children).

Sterilized men (at a mean age of 35.5 years) and women (at a mean of 33.5 years) were, on average, four years older than their counterparts who were not sterilized (not shown). By the date of the interview, couples had experienced an average of 1.8 pregnancies—1.6 among nonsterilized couples and 2.3 among sterilized couples. As would be expected, sterilized couples had more children (2.6) than nonsterilized couples (1.6). The average marriage duration was 7.8 years; sterilized couples tended to have been married considerably longer (10.9 years) than nonsterilized couples (6.8 years). Further, couples in which the husband was sterilized tended to have been married longer (12.3 years) than were couples in which the wife was sterilized (9.6 years).

CHOOSING STERILIZATION

The descriptive results show that almost 12% of currently married 20-39-year-old men were themselves sterilized, while nearly 13% had a wife who was sterilized. Contraceptive sterilization was relatively more common among whites, among Protestants and among couples in which the husband had a high school education (Table 2).

Table 2. Among 20-39-year-old men, percentage of couples sterilized and percentage whose method is male or female sterilization, by individual and couple characteristics

Characteristic	Total	Male	Female
TOTAL	24.1	11.5	12.6
HUSBAND'S CHARACTERISTICS			
Age			
20-24	3.9	0.0	3.9
25-29	10.1	4.6	5.5
30-34	22.8	8.0	14.8
35-39	38.3	21.6	16.7
Race			
White	26.4	13.5	12.9
Black	16.0	1.6	14.4
Other	15.4	5.9	9.5
Education			
<high school	20.4	4.8	15.6
High school	28.8	13.7	15.1
>high school	20.4	10.9	9.5
Religion			
Protestant	27.9	12.6	15.3
Catholic	21.8	10.9	10.9
Other	7.7	2.6	5.1
None	17.9	11.2	6.7
Region of residence			
Northeast	20.0	7.9	12.1
South	23.6	7.1	16.5
Midwest	27.9	15.7	12.2
West	23.2	15.1	8.1
WIFE'S CHARACTERISTICS			
Age			
20-24	3.6	2.4	1.2
25-29	14.4	5.1	9.3
30-34	24.7	10.4	14.3
>=35	43.8	23.9	19.9
Race			
White	25.9	13.3	12.6
Black	15.5	0.9	14.6
Other	18.7	7.7	11.0

Education			
<high school	23.8	8.2	15.6
High school	24.8	11.3	13.5
>high school	23.5	12.4	11.1
Religion			
Protestant	27.6	12.0	15.6
Catholic	21.2	10.6	10.6
Other	7.6	3.5	4.1
None	23.7	17.9	5.8
TOTAL	24.1	11.5	12.6
SPOUSES' RELATIVE CHARACTERISTICS			
Age			
Same age *	24.3	13.2	11.1
Wife older †	30.8	9.7	21.1
Husband older †	21.4	9.1	12.3
Race			
Same	24.8	11.7	13.1
Different	15.5	8.8	6.7
Previous marriage			
Neither	21.8	11.7	10.1
Husband only	26.4	12.3	14.1
Wife only	28.5	7.6	20.9
Both	41.6	14.0	27.6
Education			
Same level	20.2	10.9	9.3
Wife more	33.0	13.3	19.7
Husband more	27.7	11.7	16.0
Religion			
Same religion	26.5	12.0	14.5
Different religion	16.1	9.7	6.4
COUPLE CHARACTERISTICS			
Marriage duration			
¾3 years	9.1	1.7	7.4
4-7 years	16.9	6.0	10.9
8-11 years	32.0	14.6	17.4
>=12 years	44.2	27.2	17.0
No. of pregnancies			
¾1	11.5	3.2	8.3
2	30.3	17.0	13.3
>=3	38.0	19.1	18.9
No. of children			
¾1	5.2	1.5	3.7
2	32.6	16.7	15.9
>=3	44.2	21.3	22.9
Status of last pregnancy			
Intended	24.5	12.3	12.2
Unintended, female			

method used	31.4	14.2	17.2
Unintended, male			
method used	48.7	35.5	13.2
Unintended, no			
method used	29.8	14.1	15.7
No pregnancy			
in this marriage	12.5	2.4	10.1
*Within three years. †By three or more years			

Reliance on contraceptive sterilization increased with age, marriage duration, number of pregnancies and number of children (including adopted children and stepchildren). The relative characteristics of the partners indicate that couples were more likely to have chosen contraceptive sterilization if they were of the same race or the same religion or if both were previously married.

Further, couples in which the wife was older or had a higher level of education than the husband were more likely to have chosen contraceptive sterilization than were couples who were fewer than three years apart in age or who had a similar level of educational attainment. The proportion sterilized was higher among couples whose last pregnancy was unintended, especially if the pregnancy occurred while a male method or one that required the husband's cooperation was being used.

Table 3 shows the results of multivariate models; although the table shows only logistic regression coefficients, we provide some odds ratios in the text. The first model represents the direct effects of the husband's individual characteristics and the couple's joint characteristics, along with the indirect effects of the spouses' relative characteristics. In the second model, we have substituted the wife's individual characteristics for those of the husband, to examine the direct effects of the wife's characteristics. In the third model, we kept both the husband's and the wife's characteristics in the equation. While the advantage of this approach is that it provides a better estimate of the interaction effects, the disadvantage is that some of the individual-level factors lose their statistical power because of the strong collinearity between spousal characteristics (e.g., wife's race is highly correlated with husband's race). Nonetheless, the results are more informative and meaningful when all three models are displayed.

Table 3. Logistic regression coefficients showing the effect of various characteristics on a couple's choice of contraceptive sterilization over other methods, by which spouse's characteristics are controlled for in the analysis

Characteristic	N	Husband's	Wife's	Both
HUSBAND'S CHARACTERISTICS				
Age	1,671	0.1095***	na	0.0776*
Race				
White†	993	0.0000	na	0.0000
Black	501	-1.0004***	na	-1.1363
Other	177	0.1678	na	-0.1497
Education				
< high school	158	-1.0612***	na	-1.6489***
High school†	640	0.0000	na	0.0000

>high school	873	-0.4534**	na	0.1857
Religion				
Protestant†	1,046	0.0000	na	0.0000
Catholic	404	-0.3664*	na	-0.5426*
Other	68	-2.1579***	na	-1.6978*
None	153	-0.4855	na	-0.8356*
Region of residence				
Northeast	247	-0.2289	-0.2503	-0.1570
South	754	-0.1151	-0.0952	-0.0329
Midwest	413	-0.0934	-0.0209	-0.0082
West†	257	0.0000	0.0000	0.0000
WIFE'S CHARACTERISTICS				
Age	1,671	na	0.0983***	0.0474
Race				
White†	1,007	na	0.0000	0.0000
Black	476	na	-0.8320**	0.1721
Other	188	na	0.2664	0.6028
Education				
< high school	162	na	-0.1034	0.3847
High school†	660	na	0.0000	0.0000
>high school	849	na	-0.1469	-0.7888
Religion				
Protestant†	1,063	na	0.0000	0.0000
Catholic	411	na	-0.1637	0.1469
Other	88	na	-1.5596***	-0.6142
None	109	na	-0.0775	0.5480
SPOUSES' RELATIVE CHARACTERISTICS				
Age				
Same age†	902	0.0000	0.0000	0.0000
Wife older	184	0.4885*	-0.2076	0.1419
Husband older	585	-0.3109	0.1267	-0.1975
Race				
Same race†	1,534	0.0000	0.0000	0.0000
Different race	137	-0.6366*	-0.6524*	-0.7450*
Previous marriage				
Neither†	1,237	0.0000	0.0000	0.0000
Husband only	152	0.2182	0.3531	0.1858
Wife only	176	0.3375	0.2904	0.3259
Both	106	1.1795***	1.1750***	1.2213***
Education				
Same level†	1,036	0.0000	0.0000	0.0000
Wife more	307	0.8118***	0.7606***	1.5384**
Husband more	328	0.3821*	0.3275	-0.2908
Religion				
Same†	1,326	0.0000	0.0000	0.0000
Different	345	-0.4225*	-0.4953**	-0.3561*

COUPLE CHARACTERISTICS				
Marriage duration				
(in years)	1,671	0.0781***	0.0829***	0.0668**
No. of pregnancies	1,671	0.0291	0.0083	0.0224
No. of children	1,671	0.3365***	0.3196***	0.3537***
Status of last pregnancy				
Intended†	824	0.0000	0.0000	0.0000
Unintended, female method used	118	0.8543**	0.8818**	0.8440**
Unintended, male method used	74	1.1635***	1.0722***	1.1875***
Unintended, no method used	291	0.4607*	0.4357*	0.4703*
No pregnancyin this marriage	364	-0.2506	-0.3019	-0.3577
Constant		*-5.9267****	*-5.7979****	*-6.3212****
Log likelihood		*-684.1*	*-698.7*	*-677.7*
Chi-squared (df)		*422.2 (27)***	*393.0 (27)***	*435.0 (35)****
*p<.05. **p<.01. ***p<.001. †Reference group.				

The multivariate results in Table 3 support the bivariate results. Reliance on contraceptive sterilization significantly increased with husband's age, wife's age, marriage duration and couple's number of children. After controlling for husband's characteristics, we found that couples were about 60% more likely to rely on sterilization if the wife was older than if the partners were about the same age (odds ratio of 1.63). The effect of age similarity was dissipated when we controlled for either the wife's age or the ages of both spouses.

We also observed strong race effects: Black couples were 60% less likely to use sterilization than were white couples (odds ratio of 0.37). Furthermore, race played an important role in the sterilization decision, such that spouses in interracial marriages were 53% less likely to have been sterilized than were spouses of the same race (0.47).

A similar pattern was found with respect to the effect of religion. Sterilization was significantly more likely to be the method of choice among couples in which the husband was affiliated with a Protestant denomination. The wife's religion had a more limited effect, with no significant difference between Catholic and Protestant wives. As with race, similarity in religious background had a strong positive effect on the sterilization decision: When both spouses' characteristics were controlled for, same-religion couples were 1.4 times more likely to have been sterilized than were couples with dissimilar religious affiliations.

Husband's education had mixed effects on the choice of sterilization. In the analysis controlling for men's characteristics, the likelihood of sterilization was reduced among men with less than a high school education, as well as for men with more than a high school education (odds ratios of 0.35 and 0.64, respectively). This is not very surprising, because different education effects are being captured. Less educated men may be hesitant about sterilization because of misconceptions resulting from a lack of information; more educated men are more likely to be married to women who are able

to reliably use a highly efficacious method and therefore avoid sterilization.

The second model shows that wife's education had no significant direct effect on the choice of sterilization. As for the effect of the education interaction, we found that sterilization was significantly more likely to be the method of choice among couples in which the wife had a higher level of education than the husband than among couples with similar educational attainment (odds ratio of 4.7 when both the husband's and wife's characteristics are controlled for).

Previous marriage experience also increased the probability of sterilization if both spouses had been married before: Couples in which both the husband and the wife had previously been married were 3.4 times more likely to be sterilized than were couples in which neither partner had previously been married.

The couple's fertility and contraceptive experience was also a powerful predictor of whether or not they relied on sterilization. Analogous to Mumford's finding regarding a pregnancy scare as a motivating factor in obtaining sterilization, [21] our results indicate that unintended pregnancy markedly increased couples' reliance on contraceptive sterilization. Compared with those whose last pregnancy was intended, couples were nearly three times as likely to have turned to sterilization if their last pregnancy resulted from ineffective contraceptive use or method failure; this was especially so if the method was a male method or one requiring the husband's cooperation (odds ratio of 3.3 in the model using both husband's and wife's characteristics). Even if the unintended pregnancy resulted from nonuse rather than from method failure, couples were 60% more likely to have opted for sterilization than if the last pregnancy was intended, once both partners' characteristics have been taken into account.

Neither region of residence nor the couple's number of pregnancies appears to have had a demonstrable effect on the sterilization decision. The lack of regional differences is not surprising, in that the availability of sterilization probably does not significantly vary among regions, and we have controlled for compositional variations in the population that might have influenced access to sterilization.

Choosing Vasectomy

The bivariate associations of the explanatory factors with the choice of male sterilization vs. female sterilization are also shown in Table 2. Couples were slightly less likely to have chosen male sterilization over female sterilization if either partner was under age 35; male sterilization was somewhat more common at older ages. Male sterilization was also relatively less common if the husband or the wife had less than a high school education, and was slightly less frequent among couples with a high school education.

The most conspicuous factor was race. Although white couples were equally divided between male and female procedures, vasectomy among black couples was virtually nonexistent: Among more than 90% of sterilized black couples, the wife had been sterilized.

There were some regional differences in the choice of procedure. Female sterilization was more common than vasectomy in the Northeast and the South, while vasectomy was favored in the Midwest and the West. As would be expected, reliance on

contraceptive sterilization increased with marriage duration, but men were more likely to have been sterilized if the couple had been married for 12 years or longer, while in marriages of shorter duration the woman was more likely to have obtained a tubal ligation. An unintended pregnancy in which a male method had failed was associated with a higher likelihood of vasectomy.

To estimate the net effects of individual characteristics and measures of contraceptive use and fertility on the likelihood of choosing male sterilization, we used multinomial logistic regression. In Table 4 (page 106), we examine the likelihood of a couple's choosing vasectomy over tubal ligation. Once again, three logit models were estimated.

Table 4. Multinomial logistic regression coefficients showing the effect of various characteristics on a couple's choice of male sterilization over female sterilization, by which spouse's characteristics are controlled for in the analysis

Characteristic	N	Husband's	Wife's	Both
HUSBAND'S CHARACTERISTICS				
Age	1,671	0.0713	na	0.1559*
Race				
White†	993	0.0000	na	0.0000
Black	501	-2.3326**	na	0.7337
Other	177	-0.6378	na	-0.2307
Education				
< high school	158	-0.8086	na	-0.1802
High school†	640	0.0000	na	0.0000
>high school	873	0.0271	na	-0.7195
Religion				
Protestant†	1,046	0.0000	na	0.0000
Catholic	404	-0.1801	na	-0.3869
Other	68	-1.0408	na	-2.0262
None	153	0.7462	na	-0.2134
Region of residence				
Northeast	247	-1.1426**	-1.2036**	-1.2231**
South	754	-1.2966***	-1.3121***	-1.2777***
Midwest	413	-0.6930*	-0.7074*	-0.7484*
West†	257	0.0000	0.0000	0.0000
WIFE'S CHARACTERISTICS				
Age	1,671	na	-0.0167	-0.1088
Race				
White†	1,007	na	0.0000	0.0000
Black	476	na	-2.9592**	-3.7304*
Other	188	na	-0.8504*	-0.4761
Education				
< high school	162	na	-0.3182	-0.7712
High school†	660	na	0.0000	0.0000
>high school	849	na	0.3583	0.8270
Religion				
Protestant†	1,063	na	0.0000	0.0000
Catholic	411	na	0.1021	0.3499

Other	88	na	0.0499	1.2424
None	109	na	1.4961**	1.6082*
SPOUSES' RELATIVE CHARACTERISTICS				
Age				
Same age†	902	0.0000	0.0000	0.0000
Wife older	184	-0.4887	-0.4363	0.1012
Husband older	585	-0.4814	-0.3845	-0.9375**
Race				
Same race†	1,534	0.0000	0.0000	0.0000
Different race	137	0.4698	0.6223	0.3495
Previous marriage				
Neither†	1,237	0.0000	0.0000	0.0000
Husband only	152	-0.1485	0.1117	-0.1109
Wife only	176	-1.2990**	-1.1687**	-1.1416*
Both	106	-0.3937	-0.1129	-0.2332
Education				
Same level†	1,036	0.0000	0.0000	0.0000
Wife more	307	-0.3333	-0.5559*	-1.0715
Husband more	328	-0.2657	0.0291	0.5101
Religion				
Same†	1,326	0.0000	0.0000	0.0000
Different	345	0.6769*	0.6899*	0.7075*
COUPLE'S CHARACTERISTICS				
Marriage duration (in years)	1,671	0.0565	0.1105**	0.0734*
No. of pregnancies	1,671	-0.2689*	-0.2907*	-0.2541*
No. of children	1,671	0.1274	0.1405	0.1125
Status of last pregnancy				
Intended†	824	0.0000	0.0000	0.0000
Unintended, female method used	118	-0.1043	-0.1909	-0.3003
Unintended, male method used	74	1.5242***	1.2544**	1.4496**
Unintended, no method used	291	0.0849	-0.0189	0.0034
No pregnancy	364	-1.2451*	-1.2842*	-1.2827*
Constant		*-1.4935*	*0.6398*	*-0.9597*
Log likelihood		*-894.3*	*-905.4*	*-880.2*
Chi-squared (df)		*542.3 (54)* ***	*520.2 (54)* ***	*570.5 (70)* ***
*p<.05. **p<.01. ***p<.001. †Reference group.				

The husband's individual characteristics were strongly associated with the choice of vasectomy over tubal sterilization. For example, the likelihood of vasectomy was increased by about 17% with each year of age in the analysis controlling for wife's age. The age effect was curvilinear—that is, the effect of age on the vasectomy decision was stronger at older ages than at younger ages. §*** Moreover, the effect of the husband's age on the choice of procedure varied with the wife's age: Once both spouses' ages were

controlled for, men who were more than three years older than their wives were significantly less likely to have chosen vasectomy than were couples of about the same age (odds ratio of 0.39).

The strong effects by race observed in the bivariate analysis remained in the multivariate context as well. Controlling for husband's characteristics showed that black men were significantly less likely than white men to have chosen vasectomy over female sterilization. We observed a similar race effect when we added the wife's characteristics: Husbands with a black or a nonwhite wife were less likely to have had a vasectomy than were husbands with a white wife. §****

Education and religion had weak effects on the choice of the male procedure over the female procedure. After controlling for the effects of the wife's characteristics, we found that the interaction of spouses' education indicated that if the wife had more schooling than her husband, a couple's likelihood of having had a vasectomy was reduced relative to couples of similar educational background.

Men married to women not affiliated with an organized religion were 4.5 times more likely than those married to Protestants to be sterilized. Since the husband's own religion had no direct effect, the small effect associated with having a nonreligious wife was largely an effect of religious dissimilarity: Both men and women not affiliated with a religion were more likely to have been married to a spouse who was affiliated with a religion than to marry a spouse who, like themselves, was not affiliated (not shown). Although interfaith couples were significantly less likely to have chosen contraceptive sterilization, such couples who elected sterilization were twice as likely as same-religion couples to choose vasectomy over tubal sterilization.

Just as the probability of sterilization increased with marriage duration, so too did the chances that the couple had chosen vasectomy over female sterilization. The spouses' prior marital experience also influenced their choice of procedure: Couples were significantly more likely to have chosen female sterilization over vasectomy if the wife had been married before.

The couple's fertility and contraceptive behavior were also powerful predictors of sterilization behavior. Whereas the couple's total number of children (from the current marriage or previous marriages, as well as foster or adopted children) was a significant factor in the choice of sterilization, the couple's number of pregnancies in their current marriage increased the likelihood of choosing female sterilization over vasectomy. Furthermore, when a couple's number of pregnancies was controlled for, an unintended pregnancy caused by failure of a male method was associated with a four-fold increase in the likelihood of vasectomy over female sterilization relative to couples whose last pregnancy was intended (odds ratios of 3.5-4.6, depending on the analysis). Although an unintended pregnancy resulting from nonuse of contraceptives had a similar effect on the sterilization decision, it had no effect on which procedure was chosen.

Contextual effects on the sterilization decision were demonstrated through the couple's region of residence at the time of the survey: Married men who lived in the West were significantly more likely than those who lived in the South, Midwest or Northeast to have chosen vasectomy over female sterilization. It is not immediately

clear why there was a strong regional variation in preference for vasectomy, especially when the general decision whether to choose contraceptive sterilization did not show any regional differences.

DISCUSSION

Past research has generally maintained that the decision to seek sterilization is made jointly between husbands and wives, yet the assessment of factors associated with this behavior has focused on the characteristics of only one spouse. Some prior research has demonstrated the value of considering the characteristics of both spouses, as well as the relationship context in which sterilization decisions are made. [22] Further, it is increasingly evident that the decision to obtain sterilization is based on different considerations than the decision about which partner gets sterilized. Even if the outcome is a joint decision, partners in intimate relationships do not always have exactly matching desires. When individual interests conflict, the outcome may depend on access to and control of resources. Factors that traditionally affect individuals' access to resources, such as age, education, and income, delineate the power differences between partners, and these ultimately influence both the decision-making process and the outcome.

In this article, using data from a national sample of men, we have found that among currently married couples the decision to seek sterilization is differentially influenced by the spouses' individual characteristics and is mediated by the relative characteristics of the husband and wife, as well as by factors that typically represent the interpersonal context of their relationship. For example, the husband's age, race, education and religion had strong effects on the likelihood of sterilization, while the wife's characteristics played a lesser role. Nevertheless, sterilization occurred more frequently if the wife was older or more highly educated than her husband.

As for the strong racial differences observed, some researchers have concluded that low rates of sterilization among black and Hispanic men are explained by cultural differences in the perception of the relationship between the ability to conceive and masculinity. [23] Others have argued that machismo is not the issue, but that ethnic minorities in the U.S. lack sufficient knowledge to consider vasectomy as a method of birth control. [24] Within particular subgroups of the population in which vasectomy rates are very low, access to information and "role models" may be limited. If, as interviews with men have suggested, talking with another vasectomized man is an important step in the decision-making process, [25] it may be necessary for family planners to link potential candidates with role models, especially if the candidate is from a subgroup within which vasectomy rates are low.

Low education may indicate a lack of access to information about sterilization in general, and about vasectomy in particular; it may also be associated with misconceptions regarding vasectomy. Furthermore, an unintended pregnancy might have a higher opportunity-cost for, and would therefore be more burdensome to, couples of lower socioeconomic status (assuming that husband's or wife's education is a fair indicator of the couple's socioeconomic status).

Religious differences indicate the normative constraints placed by different doctrines on the practice of contraception in general, and of sterilization in particular. This is

evident from the lower probability of sterilization among Catholic men and among followers of "other" religions. Given the strong position taken by the Roman Catholic Church on issues of procreation and contraception, the effect of Catholic affiliation on sterilization is not as strong as would be expected, and is notable among husbands but not among wives. Religious affiliation is also more influential in the selection of sterilization as a means of birth control than it is in the choice of procedure.

The observed increase in sterilization according to marriage duration after the effects of age and parity (which are also linked to marriage duration) have been controlled offers some support for the view that couples who are married longer communicate better about these issues. Older age, longer marital duration and higher parity are also associated with marital stability, commitment and a decline in demand for children, all of which would be expected to increase sterilization use. These same factors may account for the finding that prior marital experience increased spouses' probability of sterilization.

Sterilization was significantly less frequent among interracial and interfaith couples than it was among racially or religiously similar couples. This is contrary to the hypothesis that mixed-marriage partners are more liberal and therefore more likely to choose contraceptive sterilization. It may be that disharmony and instability are more frequent in mixed marriages, and such factors might hinder partners from making a contraceptive decision that has such finality.

An unintended pregnancy as a motivating factor for sterilization not only accords with Mumford's "scare" stage in the decision process, [26] but has two other implications as well: that the husband and wife want no more children, and that they are not very adept at using contraceptives. Sterilization would be a logical option for such couples.

Once a couple decides to terminate childbearing, the next step is to choose between tubal sterilization and vasectomy. The process of deciding which partner gets sterilized is probably more complicated than the initial choice of sterilization. The choice of procedure may be determined more by one partner's refusal rather than by the other's acceptance. [27] Research has also shown that the spouse who is more motivated to end childbearing is the one who tends to become sterilized. [28]

We found that some factors influential in the sterilization decision were not of consequence in method choice, and the direction of some effects was reversed. Certain individual characteristics continued to influence the choice of procedure, however. (For example, being black negatively affected the likelihood of male sterilization.) It is possible that such groups remain less informed about the procedure and its consequences, that they are less open to innovation or that their cost-benefit calculus is different than that of other populations.

Residential differences in contraceptive sterilization might reflect attitudes toward sterilization or differences in the accessibility of the method. Unlike prior researchers, [29] we found no regional variations in the choice of sterilization, but there were marked regional differences in the choice of the sterilization procedure, independent of other individual and couple characteristics. Why a relative preference for vasectomy exists in the West or why men in the other regions avoid vasectomy cannot be explained with these data. Further examination of these differences may yield important information

that can be used to affect the level and type of sterilization procedures.

Factors commonly associated with better marital relations and effective marital communication appear to increase both the probability of choosing sterilization over other methods and the probability of choosing vasectomy over a female procedure. [30] In our study, duration of marriage was positively related to the choice of male sterilization, which may be linked to increased confidence in the stability of the marriage, to improved marital communication, or to the development of more egalitarian marital roles in longer marriages.

Although higher parity had a clear positive effect on the sterilization decision, its relationship to vasectomy was weak. Conversely, a couple's number of pregnancies had a very weak effect on the sterilization decision overall, but significantly increased their probability of choosing female sterilization over vasectomy. The increased effect on wife's sterilization reflects an earlier observation that the partner who most benefits from terminating childbearing (and is therefore the most motivated) is usually the person who becomes sterilized.

Couples were more likely to have chosen sterilization if their last pregnancy was unintended, especially if it resulted from contraceptive failure. The choice of sterilization method was associated in part with the type of method being used at that time, in that failure with a male method was associated with an increased likelihood of vasectomy. Method choice at the time of the unwanted pregnancy may reflect marital role patterns, and male methods (as well as female methods that require joint effort and interaction) may be more characteristic of modern, egalitarian couples. [31]

Alternatively, method choice following an unintended pregnancy might be associated with contraceptive responsibility and accountability for the failure, with the partner who takes responsibility for contraception also accountable for the consequences of failure. (Partners were equally likely to choose male or female sterilization if no contraceptive method had been used when the unplanned pregnancy occurred.)

Racially and religiously similar couples were more likely than others to have chosen sterilization but were less likely to have chosen vasectomy. This reversal may provide support for two different explanations. According to one hypothesis, interfaith and interracial marriages are more likely to suffer from interpersonal strain and conflict than are marriages between people of like backgrounds. [32] Therefore, such couples would be less likely than others to choose sterilization, because such a decision would require a greater amount of marital stability and accord. On the other hand, the "selectivity" perspective suggests that dissimilar couples are more likely to obtain a vasectomy, if sterilization is chosen, since such individuals are likely to be more independent-minded, liberal and unconventional, having disregarded convention in their marital choice. [33]

The effect of educational similarity supports the opportunity-cost perspective. Since childbearing and childrearing affect women considerably more than men, the opportunity-cost at any given level of capital investment is higher for women than for men. Consequently, as our results show, couples in which the wife had a higher educational level than the husband were more likely than educationally similar couples to obtain sterilization. Furthermore, once the sterilization decision was made, tubal

sterilization was chosen if the wife had a higher education.

Despite vast improvements in contraceptive technology and decidedly low levels of fertility in the United States, unplanned pregnancies and unwanted fertilityremains a problem. It is therefore important to examine the dynamics of the sterilization decision, as well as the choice of procedure. Differences between population subgroups in levels of sterilization may have important implications for differences in unwanted fertility and the demand for abortion. A better understanding of this process and the reasons that underlie the subgroup differentials is essential for family planning practitioners. The virtual irreversibility of the procedure and the potential for poststerilization regret make this issue all the more critical.

References

1.iR.A. Hatcher, *Contraceptive Technology* , 16th Revised Edition, Irvington Publishers, New York, 1994.

2.iW.D. Mosher, "Contraceptive Practice in the United States, 1982-1988," *Family Planning Perspectives,* **22:** 198- 205, 1990.

3.iW. Moss, *Contraceptive Sterilization,* Essential Medical Information Systems, Amityville, N.Y., 1988.

4.iL.L. Bumpass, "The Risk of an Unwanted Birth: The Changing Context of Contraceptive Sterilization in the U.S.," *Population Studies,* **41:** 347-363, 1987.

5.i F.D. Bean et al., "Sociodemographic and Marital Heterogamy Influences on the Decision for Voluntary Sterilization," *Journal of Marriage and the Family,* **49:** 465-476, 1987.

6.i L.L. Bumpass and H.B. Presser, "Contraceptive Sterilization in the U.S.: 1965 and 1970," *Demography* , **9:** 531-548, 1972; and J. Arevalo, A.O. Wollitzer and S. Arana, "Vasectomy: Views of Latinos and White Men," *Journal of Family Practice,* **24:** 493-496, 1987.

7.i C.W. Warren et al., "Contraceptive Sterilization: A Comparison of Mexican-Americans and Anglos Living in U.S. Counties Bordering Mexico," *Social Biology,* **28:** 265-280, 1981; and F.D. Bean et al., 1987, op. cit. (see reference 5).

8.i Ibid.

9.i L.L. Bumpass, 1987, op. cit. (see reference 4); and F.D. Bean et al., 1987, op. cit. (see reference 5).

10.i S.H. Cochrane and F.D. Bean, "Husband-Wife Differences in the Demand for Children," *Journal of Marriage and the Family* , **38:** 297-307, 1976.

11.i W.B. Miller, R.N. Shain and D.J. Pasta, "Tubal Sterilization or Vasectomy: How Do Married Couples Make the Choice?" *Fertility and Sterility* , **56:** 278-284, 1991.

12.i Ibid.

13.i F.D. Bean et al., 1987, op. cit. (see reference 5).

14.i S.D. Mumford, "The Vasectomy Decision-Making Process," *Studies in Family Planning,* **14:** 83-88, 1983.

15.i A.I. Hermalin, "Fertility Regulation and Its Costs: A Critical Essay," in R.A. Bulatao and R.D. Lee, eds., *Determinants of Fertility in Developing Countries, Volume 2,* Academic Press, New York, 1983.

16.i K. Tanfer, "National Survey of Men: Design and Execution," *Family Planning Perspectives,* **25:** 83-86, 1993.

17.i L.L. Bumpass, 1987, op. cit. (see reference 4).

18.i F.D. Bean et al., 1987, op. cit. (see reference 5).

19.i Ibid.

20.i E.A. Hanushek and J.E. Jackson, *Statistical Methods for Social Scientists,* Academic Press, New York, 1977.

21.i S.D. Mumford, op. cit. (see reference 14).

22.i W. Miller, R. Shain and D. Pasta, 1991, op. cit. (see reference 11); and F.D. Bean et al., 1987, op. cit. (see reference 5).

23.i S.G. Philliber and W.W. Philliber, "Social and Psychological Perspectives on Voluntary Sterilization: A Review," *Studies in Family Planning,* **16:** 1-29, 1985.

24.i J. Arevalo, A.O. Wollitzer and S. Arana, 1987, op. cit. (see reference 6).

25.i S.D. Mumford, 1983, op. cit. (see reference 14).

26.i Ibid.

27.i L.M. Markman and H.A. Frankel, "The Choice of Sterilization Procedure Among Married Couples," *Journal of Family Practice,* **14:** 27-30, 1982.

28.i W. Miller, R. Shain and D. Pasta, 1991, op. cit. (see reference 11).

29.i F.D. Bean et al., 1987, op. cit. (see reference 5); and L.L. Bumpass, 1987, op. cit. (see reference 4).

30.i F.D. Bean et al., "Husband-Wife Communication, Wife's Employment, and the Decision for Male or Female Sterilization," *Journal of Marriage and the Family,* **45:** 395- 403, 1983; and F.D. Bean et al., 1987, op. cit. (see reference 5).

31.i W. Miller, R. Shain and D. Pasta, 1991, op. cit. (see reference 11).

32.i F.D. Bean et al., 1987, op. cit. (see reference 5).

33.i Ibid.

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*** Of the total sample of 20-39-year-old men, 1,689 were currently married at the date of the interview. Of these, 10 had been sterilized prior to their current marriage, five were sterile but had not had a vasectomy and three others were missing the date of their vasectomy. These cases were dropped, resulting in a final sample of 1,671 currently married men.**

**** Nonuse was included as a contraceptive choice because the decision to use or not to use a contraceptive method, and which method to use, is believed to be made jointly rather than sequentially. That is, individuals are assumed to weigh the risks of not using a contraceptive method along with the risks of using each of the available methods (see R.R. Rindfuss, C.G. Swicegood and L.L. Bumpass, "Contraceptive Choice in the United States: Process, Determinants and Change," in R.A. Bulatao, J.A. Palmore and S. Ward, eds., *Choosing a Contraceptive Method: Method Choice in Asia and the United States,* Westview Press, Boulder, Colo., 1989, pp. 237-256).**

† In about 1.5% of responses, the husband did not report information on one or more items pertaining to the spouse. In initial analyses, we included dummy variables for missing data on wife's education, religion, race, date of marriage and intention status of last pregnancy. None of the dummy variable categories indicating missing data were statistically significant, however. Consequently, to simplify the model, these were dropped from the final analyses.

‡ We considered other age contrasts, such as spouses being five or more years older than their partner, but preliminary analyses showed no difference between the three-year increment and

the five-year increment.

§Even though the two fertility measures—the total number of children andthe couple's number of pregnancies—were highly correlated, there were two reasons to include both. First, a substantial proportion of the men had either more (18%) or fewer (17%) children than the number of pregnancies that they and their current wife had experienced. Second, these two measures tapped different aspects of fertility behavior and expectations.

§* Female methods included the pill, the IUD, the diaphragm, the sponge and spermicides.

§** Male methods included the condom and other methods that require male cooperation, such as withdrawal and the rhythm method.

§*** In analyses not shown here, we included an age-squared term in the model to test for the nonlinearity of the relationship between age and sterilization. The result for the age-squared term was a statistically significant, positive coefficient indicating that the relationship is curvilinear and that the age effect increases at older ages.

§**** Undoubtedly, spouses' races are highly correlated, and when both are included in the same model they vie to explain the same variance. Whereas either spouse's race alone is a powerful predictor, one spouse's race neutralizes the effect of the other's race when both are included.