

Original research article

Novel restricted access to vasectomy in Iran: addressing changing trends in vasectomy clients' characteristics over 16 years in northwestern Iran

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Abstract

Objectives: This study is designed to evaluate the popularity of vasectomy in Iran. The study was conducted to calculate the frequency of vasectomy over time, to compare vasectomy users' characteristics with the general population and whether these characteristics have changed over time.

Study Design: A cross-sectional study of 7864 men undergoing vasectomy in a 16-year period was conducted in Urmia, Iran. Comparative statistics described differences between vasectomy users and nonusers. The data were analyzed separately in two 8-year periods, 1996–2003 and 2004–2011. The time period did not involve 2012, the year which vasectomy became outlawed in the whole country.

Results: During the study period, the contraceptive prevalence rate of vasectomy increased from 0.1% to 3.35%. Vasectomy users were predominantly older, better educated, had more children and more urban residents than the general male population ($p < 0.001$). Over time, men who underwent vasectomy tended to be younger, have well-educated wife and rural resident ($p < 0.05$).

Conclusions: This study highlighted a dramatic rise in the use of vasectomy between 1996 and 2011 in Iran. While the characteristics of vasectomy users versus general population were different, especially in age, education, resident area, number and sex of their children, there were significant changes from two 8-year study time periods.

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Keywords: Vasectomy; Client's characteristics; Trends; Contraceptive prevalence rate; Iran

1. Introduction

The national family planning (FP) program of Iran as a Muslim country has been a success in recent years. The FP program of Iran has gone through four stages over the past 50 years: (a) The first FP program was implemented in 1966 but with minimal changes in fertility [1]; (b) The second stage started with the Islamic Revolution (1979) and brought on fertility increasing incentives which caused a postrevolution "baby boom" [1]; (c) The third stage started in 1989 which launched a nationwide free-of-charge FP program. Consequently, total fertility rate decreased sharply from 5.5 in 1988 to less than 1.47 in 2011 [2]. (d) Since 2012, the

policy reversed once again from an anti- to a pronatalist population policy. Furthermore, doing vasectomy is a criminal act at least in public sector.

Due to permanency and near to 100% efficacy, vasectomy is the most effective contraception method to prevent pregnancy [3]. Worldwide, less than 2.4% of men rely on vasectomy for contraception [4]. Overall, the prevalence of vasectomy is higher in developed countries. Regions with higher vasectomy prevalence are North America (13.7%) and Oceania (9.8%) in 2012; at the same time, the lowest prevalence is seen in Africa (0.0%) and Asia (2.2%) [5].

Globally, the prevalence of vasectomy in Muslim countries is generally negligible, with the exception of Iran — with a vasectomy prevalence of 2.7% [4,6]. Vasectomy promotion program in Iran developed through two phases: first was the early start-up and decentralization phase in 1996–2003 where vasectomy services were introduced starting at major urban areas and a second maturation phase 2004–2011 where vasectomy promotion campaign expanded through the whole country.

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Studies suggest that the decision to use a contraceptive method is the result of different factors including demographic, religious, socioeconomic and cultural factors [7], spreading of information regarding the vasectomy procedure [8] and targeted health promotion via counseling on the method [9]. Evaluation of levels and trends in vasectomy acceptance in developing countries, especially those with Muslim populations, is crucial to inform the decisions of healthcare providers, program planners and those in charge of resource allocation.

Despite the increased popularity of vasectomy in Iran relative to other Muslim countries, we lack information on the characteristics and changing trends of sociodemographic characteristics of men choosing vasectomy. This study has three objectives: First was to evaluate the change in frequency of the method over time, second was to report demographic information on vasectomy users and the third was to compare characteristics with the general population and its changes over time.

2. Materials and methods

2.1. Study setting

West Azerbaijan is a mountainous province situated in northwest Iran with a total population of approximately 3 million. It has higher fertility and lower levels of socioeconomic development than other provinces in Iran. The province is populated mainly by two large ethnic groups namely Turks (Shiites Muslims) and Kurds (Sunni Muslims). Regional No-Scalpel Vasectomy Training Center (RNSVTC) of Urmia University of Medical Sciences was the only international vasectomy training center in Iran. Data for vasectomy procedures are drawn from the RNSVTC which was the only governmental center delivering vasectomy at the whole of Urmia district and also private clinics and hospitals. As a predetermined institutional responsibility, data on vasectomy services provided by both public and private sectors of the district have been stored in the RNSVTC.

2.2. Study design

A cross-sectional study was conducted using all records of the vasectomy clients enrolled in the RNSVTC for a 16-year period (January 1, 1996 to December 31, 2011). A total of 7864 vasectomy clients attended during the research time period; of these, only 48 users (0.6%) had the procedure in other public or private clinics. The present analysis considered all records with a retrieval rate of 100%. As a routine of the center, each vasectomy client together with his wife participated in FP counselling to obtain informed choice. The providers asked couples to complete an informed consent form for the vasectomy procedure and a structured self-administered questionnaire which was

stored for future analysis. The questionnaire gathered data on couples' demographic profile and reproductive characteristics.

2.3. Analysis

The study was conducted to answer three questions; #1: what is the frequency of vasectomy over time? #2: What are the characteristics of vasectomy users compared to the general population? #3: What are the vasectomy users' changes from the earlier to the later period of time?

This study targeted 20–54-year-old men and reproductive-age married women in Urmia, Iran. Data related to the number and characteristics of the vasectomized men for the years 2006 to 2011 were obtained from the RNSVTC record review which stored data on services provided by both public and private sectors. Data from three representative Iranian National Population and Housing Censuses conducted in 1996, 2006 and 2011 were the source of the number and characteristics of general population [10]. Total annual male and female populations for 1996, 2006 and 2011 were collected directly from national censuses. To estimate the population size for each year between these surveys, mean population growth rates were used. Then, the estimated mean population of each 8-year period was considered as the reference population of that time period. These data were also used to compute the contraceptive prevalence rate (CPR) of vasectomy during 16 years individually. The CPR of vasectomy is the proportion of women of reproductive age whose partner is using vasectomy at a given year. The numerator would have the total number of vasectomy users from record of current research, and the denominator is the number of all women of reproductive age using data extracted from the national censuses [10].

Before comparing the vasectomy user's characteristics over time, comparative statistics described differences between vasectomy users and nonusers. To do this comparison, we stratified census data of men aged 20–64 into the same variable categories as we used for the study population. We used National Census data for comparison data on age distribution, place of residence, education and sex composition of children [10]. Contraceptive uses were from the 2010 Multiple Indicator Demographic and Health Survey [6]. Differences with the general population were tested using two-sample test of the equality of proportions (Z test). To compare the two time periods for differences between vasectomy users' characteristics to nonvasectomy controls, chi-square test was used. Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS) Version 20. The value of $p < 0.05$ was considered statistically significant.

2.4. Ethical consideration

All couples gave informed consent prior to participation in the FP counselling. Survey content, consent forms, study procedures and using deidentified data were reviewed and

approved by the Research Ethics Committee of the Urmia University of Medical Sciences.

3. Results

During the study period (1996–2011), we identified 7864 couples who underwent the vasectomy procedure (2918 and 4946 cases in the 1996–2003 and 2004–2011 periods, respectively). Of those who had a vasectomy, about 98% had the procedure in the public sector (RNSVTC) and others in private hospitals and clinics. The mean age of the clients and their wives were 40.3 ± 7.1 and 34.5 ± 6.0 years, respectively. They had, on average, 2.75 children (range, 0–15 children) at the time of their procedure.

3.1. Rates and trends in vasectomy use

An analysis of all men aged 20–64 years was conducted to identify variations in vasectomy rate by different years. Table 1 depicts the district rate of vasectomy per 10,000 men across various study years. The rate of vasectomy rose with time to reach 33.8 [95% confidence interval (CI), 32.1–35.6] in 2011. Similarly, in 1996 (the starting year of this study), approximately 125,453 married women aged 15–54 years (rural 38.5%, urban 58.1%) were the group targeted for using contraceptives in the province, which increased to 222,172 (rural 31.8%, urban 68.1%) in 2011 (the ending year of the study) based on the national censuses (During the study period, Iran entered a phase in its demographic transition that is termed the *Demographic Window*. The prominent characteristic of this phase was a youth bulge. Enormous growth of reproductive age population was related to the youth bulge [11]). Using the CPR formulation, this translates to a vasectomy prevalence of 0.1% in 1996 and 3.3% in 2011.

Table 2
Percentage distribution of vasectomy users and of the general population, by selected characteristics in Urmia, Iran (1996–2011).

Characteristics		Men obtaining vasectomies N = 7864	General population*
Age (years)	20–29	4.4	20.6
	30–39	43.6	31.5
	40–49	43.1	27.8
	50–64	8.9	20.1
Wife's age (years)	15–24	4.1	18.0
	25–34	44.1	35.1
	35–44	46.1	28.2
	45–54	5.7	18.7
Place of residence	Urban	88.3	70.4
	Rural	11.7	29.6
Number of living children	1	3.2	33.0
	2	51.6	36.0
	3	28.3	16.6
	4	9.6	7.9
	≥5	7.3	6.5
Education	≤6 years	25.5	30.9
	6–12 years	54.5	61.2
	>12 years	20.1	7.9
Wife's education	≤6 years	32.3	43.2
	6–12 years	57.7	48.6
	>12 years	9.9	8.2
Sex composition of children	No male child	12.1	21.9
	At least 1 male child	87.9	78.1
	No female child	20.9	27.3
	At least 1 female child	79.1	72.7
Contraceptive use in last 6 months	Nothing	18.5	23.4
	Hormonal methods	43.0	30.6
	Condom	11.7	6.7
	Intrauterine device	12.1	21.1
	Coitus interruptus	14.7	18.2

* Z-test p-value was <0.001 for all characteristics.

Table 1
Some statistics about vasectomies in Urmia, Iran (1996–2011).

Year	No. of vasectomies	No. of 20–64 years men in the general population	Rate per 10,000 men (95% CI)	No. of married reproductive age women in the general population	CPR of vasectomy
1996	108	157,263	6.9 (6.1–7.5)	125,453	0.1
1997	350	164,824	21.2 (19.3–23.3)	131,725	0.3
1998	492	172,385	28.5 (26.5–30.7)	138,311	0.7
1999	346	179,946	19.2 (17.5–21.1)	145,226	0.9
2000	400	187,507	21.3 (19.5–23.2)	152,487	1.1
2001	328	195,068	16.8 (15.2–18.5)	160,111	1.3
2002	499	202,629	24.6 (22.8–26.5)	168,116	1.5
2003	395	210,190	18.8 (17.2–20.5)	176,521	1.6
2004	516	217,751	23.7 (21.9–25.5)	185,347	1.8
2005	495	225,312	22.0 (20.3–23.7)	194,614	2.0
2006	574	232,867	24.7 (22.9–26.4)	209,826	2.1
2007	504	240,281	21.0 (19.4–22.6)	212,912	2.3
2008	514	247,695	20.7 (19.2–22.4)	215,998	2.5
2009	652	255,109	25.6 (23.9–27.3)	219,084	2.8
2010	778	262,523	29.6 (27.9–31.4)	221,170	3.1
2011	913	269,936	33.8 (32.1–35.6)	222,172	3.3

3.2. Background characteristics

Table 2 gives the summary statistics of two study populations' characteristics. Population #1 was all vasectomy clients during 16 years, and Population #2 was the pooled sample from three censuses conducted in 1996, 2006 and 2011. As expected, the age distributions of vasectomy users and of men aged 20–64 in the general population were different ($p < 0.001$). Men undergoing vasectomy were older than the general population. Furthermore, striking differences in place of residence, number of children, education and sex composition of children existed between men choosing vasectomy and similarly aged men in the general population. Overall, vasectomy users were more educated than the general male population. About 8% of men aged 20–64 in the general population had received more than 12 years education, whereas more than 20% of the vasectomy clients had university education. Compared with general population, a vasectomy user's wife was significantly more likely to be educated (57.7% vs. 48.6% for more than 6 years education and 9.9% vs. 8.2% for university level education).

3.3. Trends in vasectomy users characteristics

Table 3 gives the summary statistics of changes in the vasectomy users' characteristics during two time periods. For most characteristic factors, a significant difference was found between vasectomy users and nonvasectomy controls comparing the two time periods. Among vasectomy clients, the proportion under 30 years old at enrollment increased from 3.7% in 1996–2003 to 4.9% in 2004–2011, in 30–39 years old age group, decreased from 47.1% to 41.5% and, in 40–49 years old age group, increased from 40.7% to 44.4% ($p = 0.001$). In contrast, there was no significant change in the proportion of different age groups of clients' wives between the two time periods ($p > 0.05$). The majority of the vasectomy clients (74.6%) and their wives (67.6%) were educated with more than 6 years of formal education.

3.4. Trends in vasectomy clients' child number

Vasectomies were performed most frequently in men who have more than one child at the time of operation. Overall,

Table 3
Distribution of vasectomy users, by selected characteristics and calendar year categories in Urmia, Iran (1996–2011).

Characteristics	Populations by 8 years categories				p value for trend (1996–2003 vs. 2004–2011)	
	1996–2003		2004–2011			
	Total population N (%)	Vasectomy* N (%)	Total population N (%)	Vasectomy* N (%)		
Age (years)	20–29	35978 (22.1)	108 (3.7)	41511 (19.1)	240 (4.9)	0.000
	30–39	51704 (31.7)	1374 (47.1)	68172 (31.3)	2053 (41.5)	
	40–49	46208 (28.3)	1189 (40.7)	59356 (27.3)	2197 (44.4)	
	50–64	29141 (17.9)	247 (8.5)	48625 (22.3)	456 (9.2)	
Wife's age (years)	15–24	30259 (19.3)	104 (3.6)	34909 (16.7)	219 (4.4)	0.545
	25–34	55387 (35.3)	1289 (44.2)	73024 (34.9)	2180 (44.1)	
	35–44	45192 (28.8)	1371 (47)	58050 (27.7)	2252 (45.5)	
	45–54	25977 (16.6)	154 (5.3)	43343 (20.7)	295 (6)	
Place of residence	Urban	111188 (68.2)	2759 (94.6)	157968 (72.6)	4183 (84.6)	0.000
	Rural	51843 (31.8)	159 (5.4)	59696 (27.4)	763 (15.4)	
Number of living children	1	42846 (29.7)	41 (1.4)	69849 (36.3)	212 (4.3)	0.000
	2	50326 (34.9)	1172 (40.2)	71356 (37.1)	2882 (58.3)	
	3	25604 (17.8)	1004 (34.4)	29897 (15.5)	1224 (24.7)	
	4	13367 (9.3)	396 (13.6)	12287 (6.4)	360 (7.3)	
	≥ 5	11931 (8.3)	305 (10.5)	9056 (4.7)	268 (5.4)	
Education	≤ 6 years	53637 (32.9)	744 (25.5)	62905 (28.9)	1258 (25.4)	0.000
	6–12 years	100543 (61.7)	1600 (54.8)	131904 (60.6)	2684 (54.3)	
	> 12 years	8851 (5.4)	574 (19.7)	22855 (10.5)	1004 (20.3)	
Wife's education	≤ 6 years	78505 (46.9)	1019 (34.9)	82475 (39.4)	1525 (30.8)	0.660
	6–12 years	77166 (46.1)	1669 (57.2)	107175 (51.2)	2872 (58.1)	
	> 12 years	11718 (7.0)	230 (7.9)	19676 (9.4)	549 (11.1)	
Sex composition of children	No male children	34889 (21.4)	264 (9.0)	49192 (22.5)	687 (13.9)	0.000
	At least 1 male child	128142 (78.6)	2654 (91.0)	168472 (77.4)	4259 (86.1)	
	No female child	42062 (25.8)	473 (16.1)	62678 (28.8)	1168 (23.6)	
	At least 1 female child	120969 (74.2)	2445 (83.8)	154986 (71.2)	3778 (76.4)	
Contraceptive use in last 6 months	Nothing	29795 (20.6)	869 (29.8)	46051 (26.1)	589 (11.9)	0.000
	Hormonal methods	44525 (30.8)	1222 (41.9)	53755 (30.5)	2159 (43.6)	
	Condom	11549 (8.0)	275 (9.4)	9649 (5.5)	643 (13.0)	
	Intrauterine device	28958 (20.1)	328 (11.2)	38809 (22.0)	620 (12.5)	
	Coitus interruptus	29460 (20.4)	224 (7.7)	28259 (16.0)	935 (18.9)	

* Chi-square p-value was < 0.001 for all characteristics.

more than half of the vasectomy clients had two children (51.6%), followed by three (28.3%), then four children (9.6%), and the remainder have one child or more than four children. We showed a dramatic decrease in family size of men seeking vasectomy by year. On trend analysis, the increase in the proportion of clients having low child number over time and decrease in the proportion of vasectomy users having more than two children was significant ($p = 0.00$) (Table 2).

4. Discussion

4.1. The rise and fall of vasectomy in Iran

As reported at the provincial level, a nationwide FP program had been established in Iran in the 1990s to achieve FP goals and included steadily increasing use of vasectomy [6]. A clear picture that has appeared from this study is the dramatic rise in the use of vasectomy between 1996 and 2011; a trend that primarily happened in urban areas, then later in rural areas in more recent years [12]. In this study, we have found total 7864 couples that underwent vasectomy in a near 1 million population during 1996–2011. It means that the vasectomy continues to be a popular choice for permanent sterilization among men in Urmia district with an increasing degree of utilization of 3.3% that is more than worldwide (2.4%) and national (2.7%) vasectomy CPR.

Although vasectomy use has increased dramatically from 1996 to 2011, vasectomy services have not been available in Iran since 2012. Since access to sterilization has important impacts on society, access to vasectomy for men is vital [13]. The current situation in Iran may lead couples to choose other less effective FP methods. One effect of this gap is to increase unintended pregnancies. In the context of 21% national unintended pregnancies [14] in spite of 77.4% contraceptive prevalence in 2010 [6], this may threaten maternal and child health by increasing unintended pregnancies and unsafe abortions.

4.2. Vasectomy users' characteristics and its trend

We reviewed trends of a significant sample size of the most complete characteristics of couples choosing vasectomy over 16 years in Urmia, Iran. Our findings, which confirm findings of a smaller and less representative study in Iran [11], suggest that men seeking vasectomies are typically mature aged, well educated and urban residents, and they (or their wives) are linked into FP services. It is clear that these men are not representative of the general population. Couples in this study had a mean number of 2.7 children; this is comparable with other areas from Iran [12] and developed countries such as USA [15] and Canada [16]. Our results, which confirm findings from developing countries [17] and Iran [18], suggest that desire for small families has increased over time.

Confirming findings of other studies from developed and developing countries, we found the age range of 30–49 years for the majority of vasectomy users [16,19–22]. Meanwhile, we observed the increasing trend in younger age groups of men using vasectomy which is consistent with a study from USA [23] but did not support the findings from many other studies [19,22,24].

In looking at education status, vasectomy choice differed significantly by wife's education, with more-educated vasectomy users' wife being much more likely than their less-educated counterparts to rely on male sterilization. Among wives, 7.9% of those with university education were using male sterilization in 1996–2003, compared with 11.1% during 2004–2011. Positive associations like this were found between women education level and method use in many African countries [25].

4.3. Strength and limitations

Our study has at least two strengths. To the best knowledge of the authors, this is the first time in the literature which changing trends and determinants of the vasectomy clients' characteristics are reporting for a long duration of 16 years and a great sample size of near to 8000 cases. The second strength is that it was a community-based study because we considered all of the vasectomy cases of the 1 million population of the Urmia district.

This study was limited to a study setting having only 1.4% of the country population; therefore, it seems that our results cannot be generalized to the overall country. The last limitation is that the data for the broader population were only collected in 3 different years, but the data for the vasectomy population were continuously collected and put in two groups. Thus, the estimates for any outcome are inferred and do not represent a true estimate for the time periods.

5. Conclusions

Our findings clearly demonstrate male participation in the reproductive health and vasectomy promotion strategy during recent decades in Iran. In addition, our study suggests that although many Iranian men are willing to undergo vasectomy, they are now unable to obtain the procedure.

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