Trends in contraceptive use and determinants of choice in China: 1980-2010[☆]

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Abstract

Background: In China, contraception is the most commonly used practice adopted by couples seeking to limit their number of children and to determine the time interval between births. Since 1980, the implementation of mandatory contraceptive strategy has reduced the fertility rate. Using large-scale data from national statistics and nationally representative sample surveys, the current study aims to assess Chinese trends in contraceptive use, and determinants of choice, from 1980 to 2010 among married couples aged 20-49.

Study Design: Since 1980, national data on contraceptive methods utilization have been gathered by the National Population and Family Planning Commission of the People's Republic of China (NPFPC). Additionally, data from three roughly representative decennial samples, (1988, 1997, 2006), of Chinese women of childbearing age (15-49 years) have been gathered by the NPFPC, through the National Family Planning and Reproductive Health Surveys in China (NFPRHS).

Results: A relatively stable Chinese mode of contraception has been established and maintained since the 1980s. This is characterized by long-term contraceptive use which is still dominant in current China. In addition, China's total contraceptive prevalence remains at the highest level across the globe from 1980 to 2010. However, the overall method composition of contraceptive use within China has changed since the mid-1990s. Over the study period, the use of sterilization increased from 30.21% in 1980 to 46.47% in 1994, and

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then declined to 31.7 % in 2010. At the same time, IUD usage increased, (39.83% in 1980 to 48.15% in 2010), as did oral contraception, (0.3% in 1980 to 0.98% in 2010), and condom usage, (2.35% in 1980 to 9.32% in 2010). The results from the multinomial logit model show that an individual's contraceptive choice depends not only on individual characteristics, including ethnicity, age, education level, household registration, region, number of living children, sex of the last living child, but also on the strength of family planning policies. A positive coefficient indicates that the looser the strength of family planning policies, the more likely the individual is to choose condoms or another short-term contraceptive method.

Conclusions: Long-term contraceptive use is still dominant in China. In fact, over the 30 year period, 1980-2010, and in comparative world perspective, China continues to have the highest total contraceptive utilization rate. Additionally, an individual's contraceptive choice is jointly influenced by the strength of family planning policies and individual characteristics.

Key words: Contraceptive prevalence; Contraceptive choice; the Client-centered policy of informed choice of contraceptives (IC policy); China

1. Introduction

Contraception is the most common practice adopted by couples seeking to limit the number of children and to determine the time interval between births [1, 2]. In the early 1970s, in seeking to limit population growth, China launched a nationwide family planning program offering birth control methods and family planning services. Known as the "later, longer, fewer" policy, it imposed limits setting later marriage age, longer intervals between births and fewer children per family. In 1979, the world's strictest family planning program, characterized by the one-child policy (one-size-fits-all, urban or rural), was introduced to control the rapidly expanding Chinese population. Promotion of the widespread use of long-term contraceptive methods has been one of the program's core strategies [3, 4].

This Chinese family planning program has remained in place for more than three decades, causing the total fertility rate (TFR) to plummet. Official statistics indicated that the TFR dropped rapidly from 5.81 in 1970 to 2.17 in 1990. In the mid to late 1990s, the TFR ranged from approximately 1.68 to 1.77 and has stabilized at that level. The success of the program had long been heavily dependent on the family planning policies advocated by the national government, including programs that promote the practice of contraception and seek to reduce fertility rates [5]. At present, the central government of China unceasingly promotes the family planning program and still promotes contraception as the main strategy to sustain the "low fertility level" [6]. Therefore, it is necessary to learn from the patterns and determinants of contraceptive practices over the past 30 years.

A few researchers studied contraceptive patterns in the 1980s, or used data from sub-regions or national routine family planning reports to compute the prevalence of contraceptive use during shorter time spans than that considered here, covering the period 1970 to 1994 [7-9]. In addition, some studies have focused mainly on the clinical results of contraception or contraceptive failure, the intensity of China's birth control program and women's interactions with the family planning service system (i.e., how women choose contraceptive tools), none of which are central to this study [10-12]. Some other studies have focused on the cost of contraceptive failure or the determinants associated with the duration of contraceptive choice [13-15]. Few research efforts, however, have been devoted to the big picture, that is, the trends in contraceptive use and determinants of choice in China at the national level and across a long-time span 1980-2010. The purpose of the current study is to utilize a number of published population data sources to fill this gap.

2. Materials and methods

This study targeted married couples of reproductive age (20-49 years) in mainland China. The descriptive statistical analysis was conducted using secondary data from the Yearbook of China's Population and Family Planning (1984-2011), compiled by the National Population and Family Planning Commission of the People's

Republic of China[16]. These data have been used to compute the contraceptive utilization rates. By employing standardization per grand mean centering methods, it has become possible to make comparisons from multiple data sources. The data for contraceptive usage for other countries are from the World Contraceptive Use 2010 databases maintained by the Population Division of the United Nations [17].

In addressing the determinants of contraceptive choice, the current study used individual-level raw data from three representative, decennial waves (1988, 1997, and 2006). These data were available from the National Family Planning and Reproductive Health Surveys in China (NFPRHS), conducted by the National Population and Family Planning Commission of the People's Republic of China in July 1988, September 1997, and July 2006. The goal was to explore the determinants of contraceptive choice at the individual level, especially those choices made due to the impact of contraceptive policy enforcement efforts by the central government. The three surveys mentioned represented samples of 2,100,000 women of childbearing age in 1988, 15,000 in 1997, and 33,257 in 2006. They were taken from mainland China populations, targeting married women aged 15 to 57 years. Complete pregnancy and contraceptive histories were collected from female respondents, together with socioeconomic and demographic information about themselves, their husbands, and other household members. These data are nationally representative.

With the sampling units of the survey in 1997 as baseline, this study randomly selected 14,000 paired samples (20-49 married women) from each wave (1988, 1997, and 2006). Due to differences in the questionnaire, Tibet samples were dropped. After validation testing and data merging [18], the study was finally comprised of 42,000 samples for modelling.

Dependent variables in the questionnaire were nominally measured by a set of contraceptive methods (e.g., sterilization use, IUD use, condom use, oral pill use and others), while explanatory variables included policy variables and demographic variables. Policy variables were operationalized by indicators of year. Evidence in the initial questionnaire design and survey menu showed that the survey years represented various

characteristics of contraceptive policy in China [19]. During 1979-1988, for example, the central government strictly forced married couples to perform "IUD insertion after the first birth, sterilization after the second birth, and induced abortion for the third pregnancy." This was also when the "one veto" system of cadre evaluation was developed; as such, this period was known as "tight policy". In 1997, the client-centered informed choice contraceptive policy (IC policy) was just beginning to be implemented and was being tested in only 11 provinces. Compared to the 1980s, this period was known as "moderate policy" [20]. In contrast, at the beginning of the 21st century, the IC policy was promoted throughout China; individuals were encouraged to choose and could choose any of the available contraception methods; this period 2001-2006 was known as "loose policy"[21]. Thus, a set of ordinal variables were developed to represent the degree of intensity of the family planning policy (as indicated by tight, moderate, and loose). Although this measurement is a rough approximation, there are no existing data to directly test the policy strength. Other variables in this model were acquired by direct measurement.

In this hierarchical data structure, there are policy variables that serve as high-level variables. The model should have employed a multilevel logit model that can solve the problem of homogeneity with two-level error items. A random effect intercept multilevel model was introduced and showed that the intra-class correlation, which represented the proportion of explanatory variance with high-level variables, was less than 5%. This auxiliary statistic indicated that there was no significant difference between this multilevel logit model and a classic multinomial logit model [22]. Therefore, a classic multinomial logit model was employed to relate the contraceptive choice by individuals.

3. Results

3.1. Overall contraception levels

Approximately, 30,140,000 people (rural 73.75%, urban 26.25%) adopted contraception during the period 1970-1974, and 40,012,200 people (rural 77.77%, urban 22.23%) did so during 1975-1979. The average total contraceptive prevalence was calculated to be 13.47% among married couples for each year.

In the 1980s, the one-child policy began unfolding and was intensified in the years to follow. The widespread use of long-term contraceptive methods was the core strategy. In 1980-1983, the central government forced married couples to practice contraceptive use through so-called "mass mobilization campaigns," including "mandatory IUD insertion for women with one child, abortion for unauthorized pregnancies, and sterilization for couples with two or more children" [23]. As a result, an estimated 172,693,228 people were forced to accept contraception, which made the total contraceptive prevalence increase dramatically from 13.47% in 1979 to 87.20% in 1980. In 1983, China achieved the world's highest levels of contraceptive use with 89.40 per cent [24]. However, the campaigns caused an uproar among the population and ignited strong resistance, especially in China's vast rural areas. The mandatory one-child policy was modified first in April 1984, with the mass campaigns ultimately being halted. The total prevalence of contraceptive use decreased to 85.82% in 1984. Nevertheless, the TFR decreased rapidly [25]. With the central government consistently promoting long-term contraceptives, the prevalence of contraceptive use slowly increased, hitting 88.11% in 1989. In 1990, 225,589,262 people used contraception for a prevalence of 88.85%, and in 2010, 269,928,676 people used contraception for a prevalence of 89.20%. (Fig. 1).

Since 1983, China has maintained the highest overall annual and global contraceptive prevalence level [26, 27]. To illustrate: 269,928,525 people in China used contraceptive methods for an utilization rate level of 88.95% in 2009, followed by Norway (82.2%), the United Kingdom (82.0%), Hong Kong (79.8%), and Switzerland (77.5%). Whether we compare China and the rest of the world, or China and other major developing nations, China consistently holds the lead in contraceptive utilization rates. (Fig. 2).

3.2. Overall contraception mode

In the early 1980s, a mode of long-term contraceptive use unique to China had begun to take shape. The overall long-term contraceptive[1] prevalence was at 70.04% in 1980, 77.72% in 1984, and 78.64% in 1989. Although the contraceptive compositions changed slightly during the 1980s, the average overall long-term contraceptive utilization rate reached a historic high of 78.5%, while the overall short-term contraceptive utilization rate was relatively low at 10%.

At the beginning of the 1990s, the mode of long-term contraceptive use was relatively stable. In 1990, the overall prevalence of long-term contraceptive use reached 79.83%, the highest level in the world. Since then, China has maintained its status as having the highest utilization rate of long-term contraceptive use. However, at 7.5%, the overall utilization rate of short-term contraceptive use was quite low in 1990. In 2010, the overall long-term contraceptive prevalence was 79.85%, while the overall short-term contraceptive prevalence had climbed to 9.35%.The non-contraceptive prevalence was estimated to be 10.8%. It is noteworthy that after 1994, the trend in contraceptive use in China changed rapidly; there was a slight increase in IUD use annually (over 60 million women at present, accounting for 70% to 90% of the overall prevalence), and a significant decrease in the use of female and male sterilization annually. (Fig. 3).

3.3. Trends in the use of different contraceptives

3.3.1. Female sterilization

From 1980 to 1989, the prevalence of female sterilization in married women fluctuated in China, partly due to family planning policy changes, such as the sudden relaxation in the one-child rule in 1984. In 1980, the prevalence of female sterilization in married women was 22.80%, and in 1982, 24.01%. In 1983, the rate suddenly rose to 34.01%, to subsequently fall to 32.67% in 1984. In the following years until 1989, the utilization rate of female sterilization remained stable. Throughout all periods, the rate remained higher in rural than in urban areas (5.4% in 1980-1983 and 14.03 % in 1984-1989).

[1] The long-term contraceptive includes female sterilization, male sterilization, IUD and subdermal implants. The short-term contraceptive includes oral contraception, condoms, contraceptive jelly, contraceptive suppositories and others.

In the 1990s, with the further strengthening of the birth control program in 1991, the utilization rate of female sterilization rapidly increased from 33.27% in 1990 to a historic high of 36.52% at the end of 1993, gradually declining in the following years. In the past decade, the prevalence of female sterilization fell from 33.38% in 2001 to 26.60% in 2010, declining by an average of 0.7 percentage points annually. (Fig. 4). Moreover, its prevalence was characterized by obvious inter-regional differentials. The prevalence of female sterilization in western regions was higher than in eastern regions. For example, in 2010, the highest prevalence of female sterilization was 64.87% in Gansu province, followed by Hainan (57.33%), and Jiangxi (55.39%); the lowest was 3.21% in Chongqing. The overall prevalence in rural areas (37.99%) was higher than in urban areas (15.21%), and higher in western regions (49.44%) as compared to central (19.45%) and eastern regions (10.91%).

3.3.2. Male sterilization

From 1980 to 1989, the prevalence of male sterilization increased dramatically, from 7.41% in 1980 to a historic high of 11.87% in 1983. The rate was nearly 6.52% lower in urban areas than in rural areas. After 1983, the rate was relatively stable, ranging from 10.21% to 10.79%. During 1984-1989, this rate was nearly 10.33% lower in urban than in rural areas.

As the one-child policy was reinforced in the early 1990s, male sterilization reached its second highest level, at 10.93% in 1992. Since then, falling by an average of 0.3 percentage points annually, the rate decreased from 10.38% in 1993 to 7.71% in 2001 to 5.1% in 2010. (Fig. 5).

Throughout China, there were large regional differences in rates of male sterilization. For example, in 2010, the highest prevalence of male sterilization was 15.44% in Guizhou province, followed by Henan (12.20%), and Sichuan (11.57%); the lowest was 0.01% in Jilin. The prevalence in rural areas (9.99%) was higher than in

urban areas (0.21%), and the prevalence was higher in western regions (9.44%) as compared to central (4.45%) and eastern regions (1.41%).

3.3.3. IUD

From 1980 to 1989, the prevalence of IUD first decreased and then slowly increased among married women in China. In 1980, the prevalence was 45.55%. After reaching an historic low, 34.26% in 1984, it slowly rose in the following years. Between 1984 and 1989, IUD use became the most prevalent contraceptive method used in urban areas followed by oral contraception and condom use. In rural areas, however, sterilization was the most prevalent method, followed by IUD usage and subcutaneous implants.

Since the 1990s, with IUD use steadily rising by an average of 0.6 percentage points annually, its prevalence increased from 36.08% in 1990 to 42.71% in 2001 to 48.15% in 2010. (Fig. 6). IUD use was characterized by inter-provincial differentials in China. For example, Liaoning (80.35%), Chongqing (78.43%), and Heilongjiang (77.93%) had a relatively higher utilization rate than other provinces (e.g. the lowest was 23.37% in Tibet) in 2010. It also characterized by urban-rural differentials, with a higher prevalence in rural (59.60%) as compared to urban areas (36.70%) in 2010. Currently, IUD use is the most prevalent method in China.

3.3.4. Condoms

From 1980-1983, condom use was on a slight downward trend for married couples in China, falling from 2.35% utilization rate in 1980 to a historic low of 1.9% in 1983. The prevalence of condom use among urban women was slightly lower than among rural women, ranging from 0.07% to 0.14%. After 1983, the rate slightly increased from 2.08% in 1984 to 3.83% in 1989, with utilization rate that was 5.95% higher in urban than in rural areas.

Since the 1990s, condom use rose by an average of 0.3 percentage points annually, while overall use increased slightly from 3.27% in 1990 to 8.58% in 2001, and to 9.32% in 2010 (Fig. 7). This increase occurred in 25 out of the 31 provinces in China, especially in Beijing, where the fastest growth was seen from 14.95% in 1990 to 54.13% in 2010.

Throughout China, there are large regional differences in the prevalence of condom use. For example, in 2010, the highest level of condom use was 54.13% in Beijing, followed by Tianjin (36.33%), and Shanghai (26.79%). The lowest level was 0.81% in Shanxi. At 17.43%, the urban utilization rate was higher than the rural rate, (1.21%); and the rate was also higher in eastern regions (16.44%) than in central (10.45%) and western regions (1.07%).

3.3.5 Oral contraception and other methods

Oral contraception use among married women in China has remained at a relatively low level as compared to the rest of the world. In 1980, the overall rate was 0.3%, and then it increased. During 1981-1989, the average oral contraception utilization rate was 4.47%. Most oral contraception users were women in urban areas between the ages of 20-29. Since the 1990s, oral contraception use fell by an average of 0.2 percentage points annually. Oral contraception use has trended downward from 4.44% in 1990 to 1.66% in 2001 to 0.98% in 2010.

Throughout China, large regional differences exist in the use of oral contraception. For example, in 2010, the highest prevalence of oral contraception use was 26.92% in Tibet, followed by Qinghai at 4.08%, and Shanghai at 3.40%; the lowest was 0.09% in Guizhou. The prevalence in urban areas (1.73%) was higher than in rural areas (0.31%), and the prevalence was higher in eastern regions (2.17%) as compared to central (1.05%) and western regions (0.02%).

The prevalence of other contraceptive methods[1] use was relatively low and decreased year by year since the 1980s. The prevalence of external spermicide was 0.76% in 1990 and fell to 0.01% in 2010. Overall, the prevalence of other contraceptive methods declined from 0.55% in 1990 to 0.03% in 2010.

3.4. Determinants of individual contraceptive choice

Table 1 shows the percentage distribution of each contraceptive choice under family planning policies of various strengths (tight, moderate, and loose). Generally, there are larger proportions of long-term methods under each policy type; however, there is a downward trend in sterilization use, an initial downward and then gradually upward trend in IUD use, and an upward trend in short-term methods following the gradually relaxed policy. All of these distributive trends are broadly consistent with Fig. 3.

The variables measuring family planning policies and individual characteristics were introduced into the multivariate analysis of the factors affecting individual contraceptive choice. Following the literature review, which used a Wald test and a combination of forward and backward selections to choose independent variables and a likelihood ratio test for a nested model, the current study selected a parsimonious logit model in Table 2.

Maximum likelihood estimates of the model were computed using Stata10.0. Parameter estimates of the multinomial logit model are presented in Table 2 for the three family planning policy variables, (tight, moderate and loose), and other demographic variables. The results indicate that family planning policies and individual characteristics are jointly significant determinants of contraceptive choice outcomes.

The greater the percentage of minorities in a sub-region, the lower the level of sterilization use is found. This association is partly due to the fact that, per central government policy, minority groups have more autonomy

[1] Other contraceptive methods include subdermal implants, diaphragm contraceptives, cervical caps, the rhythm method, spermicide, and so on.

in choosing contraceptive methods. Consequently, family planning programs are enforced much less strongly among minorities than among Han, the largest single ethnic group in China.

Long-term contraceptive methods (including sterilization and IUD) are more popular among older individuals; this result is due to the mandatory policy that forced one person from each couple to undergo sterilization during the tight policy period. However, as the policy has gradually loosened, IUD use has slowly replaced sterilization as the preferred method among women compared with other long-term methods.

Results also show that higher education levels are related to a higher probability of using condoms or other short-term methods, while an individual with lower education levels relies largely on sterilization. This finding is consistent with the influence of *Hukou* (household registration), in which urban individuals are more likely to select condoms or other short-term methods rather than sterilization. This association, in part, is because urban people generally have higher levels of education than those in rural areas, and urban sub-regions have more efficient contraceptive distribution systems than rural sub-regions.

Although the implementation effort of family planning policies is generally more stringent in western regions than in the east, even during the same policy period, people living in western regions are still more likely to use condoms and other short-term methods. The reason for this association is probably that people in western regions have a higher preference for sons [28]. The poorer a western region is, the more children people want; moreover, there is a greater desire for having a son, especially if the first child is a girl. Therefore, individuals in these regions have more interest in using short-term contraceptive methods to ultimately achieve their own purposes [29].

The more living children that a couple has, the more likely it is that they use long-term methods. This association is due in part to the fact that the country still vigorously promotes long-term contraception use to prevent a third birth, and there is still a mandatory requirement regarding contraception choices in some areas.

As expected, in the model testing the policy and multinomial outcomes, the influence of family planning policies on individual contraceptive choices is substantial. Overall, policy strength is a significant determinant of multinomial responses. Under relatively loose or moderate policies, individuals are significantly more likely to use condoms or other short-term methods than under tighter policies (the reference group); they are also less likely to use sterilization. In addition, there is a greater likelihood of adopting reversible methods (such as IUD). These results suggest the humanitarian posture of the central government, especially as the IC policy has gradually developed in China to provide more diversity of choice in contraceptive use. Looser policies lead to less sterilization use and more use of short-term methods.

4. Discussion

As reported above, a relatively stable Chinese mode of contraception, mainly characterized by long-term contraceptive use, has been established and maintained since the 1980s, with one of the most important elements in the birth control program being the massive use of program-directed contraception to achieve desired family planning goals. Operating on this mode, the China's total contraceptive prevalence remains the highest level across the globe during the last three decades, and this mode is still dominant in current China. In recent years, the method composition of contraceptive use in china has changed; this change has been characterized by the increasing use of IUD, which is the most used contraceptive among all methods employed, and serves as a substitute method for sterilization, as promoted by the central government. Despite the steady increase in the use of short-term methods and the drastic decrease in the use of male and female sterilization, the dominant long-term methods have not undergone substantial change.

A multinomial logit model was also employed in the current study to explore the associations among the different contraceptive methods (including sterilization, IUD, oral contraception, condoms and others) and the strength of family planning policies and individual characteristics. The results show that an individual's contraceptive choice depends not only on individual characteristics, including ethnicity, age, education level, *Hukou*, region, number of living children, sex of the last living child, but also on the strength of family

planning policies. There is no doubt that the impact of family planning policies and individual characteristics on contraceptive practice are mixed. In addition, a positive coefficient indicates that the looser the strength of family planning policies, the more likely the individual is to choose condoms or other short-term contraceptives. Prior to 1994, Chinese Family Planning Program intervened administratively on contraceptive behaviour via the mandatory one-child policy, free contraceptive provision and services, and organizational safeguards. At that time, most individuals had little choice but to employ long-term contraceptive methods. After 1994, when the IC policy, a looser family planning policy than the one-child policy, was introduced, the individual has been able to freely choose a contraceptive method according to his/her needs. At this point, individual characteristics began to take a more important role in influencing his/her own choice of contraceptive method.

Some of these results may be interesting to policymakers. First, as family planning policies become more relaxed, short-term methods, such as condoms, are more likely to be used. Second, more relaxed family planning policies have not only given people more freedom and more choices of contraceptive methods but have also had an impact on the option of deciding whether to adopt contraception or not. In addition, those whose last living child is a girl more likely tend to choose short-term methods rather than sterilization under the more relaxed family planning policies. Thus, in China, national policies always have a strong effect on individual choices of contraceptives.

It is worth noting that an unsatisfied desire for fertility in recent years, such as the desire among couples for more children and the cultural persistence of a preference for boys, has introduced a preference for short-term contraceptive use among women. Women who do not have a male child are more likely to choose condoms or other short-term methods than those who have one male child. This finding implies that couples with unsatisfied fertility desires and persistent sex preferences might knowingly manipulate self-control methods [29, 30]. My qualitative interviews in the villages of the Gansu, Henan and Shandong provinces between 1999 and 2009 showed that many married couples who wanted more children or at least one boy preferred to use short-term contraceptive methods, thus staging a so-called “contraceptive failure” using the short-term

methods, which allowed them to deliberately have an "unexpected pregnancy". In fact, most of them did not use short-term methods at all. In the context of the mandatory one-child policy, these behaviours appear to be in line with the local (or provincial) family planning regulations from the perspective of the government. In effect, these contraceptive behaviours have become the weapons of the weak, helping couples resist the policy while avoiding straightforward confrontation with the government. As a result, the incidence ratio of induced abortion because of the son preference, and unplanned births has increased [31]. This kind of passive resistance is rooted in the genuine birth goals of individuals rather than resulting from the seemingly voluntary acceptance of the birth policy, a practice seen as an open secret in rural China. There is thus a clear need to revisit established concepts of individual reproductive health rights against the backdrop of the restrictive and dominant policies of the central government.

There are some possible limitations of the current study. For example, this study targets married couples of reproductive age (20-49) in mainland China because the management of contraceptive methods and services controlled by China's central government is only targeted on this group and the data are available. However, under the influence of mass media, rapid modernization, economic expansion, and exposure to new ideas, sexual attitudes and norms have been changing rapidly among adolescents and young people in China. Emerging evidence from rural and urban areas shows increasing premarital sexual activity among adolescents and young people in China. Unprotected sexual activity puts young people at risk of unwanted pregnancy, spread of sexually transmitted disease, along with the spread of HIV/AIDS, and case reports of induced abortion have been increasing annually [32]. These associations are due in part to the fact that married couples have more efficient reproductive health services systems freely available as opposed to unmarried men and women. The reproductive health needs of young people remain poorly understood and met, with little access to appropriate and acceptable reproductive health services. Policymakers should pay more attention to this issue, especially with respect to unmarried young people's rights to reproductive health information and services.

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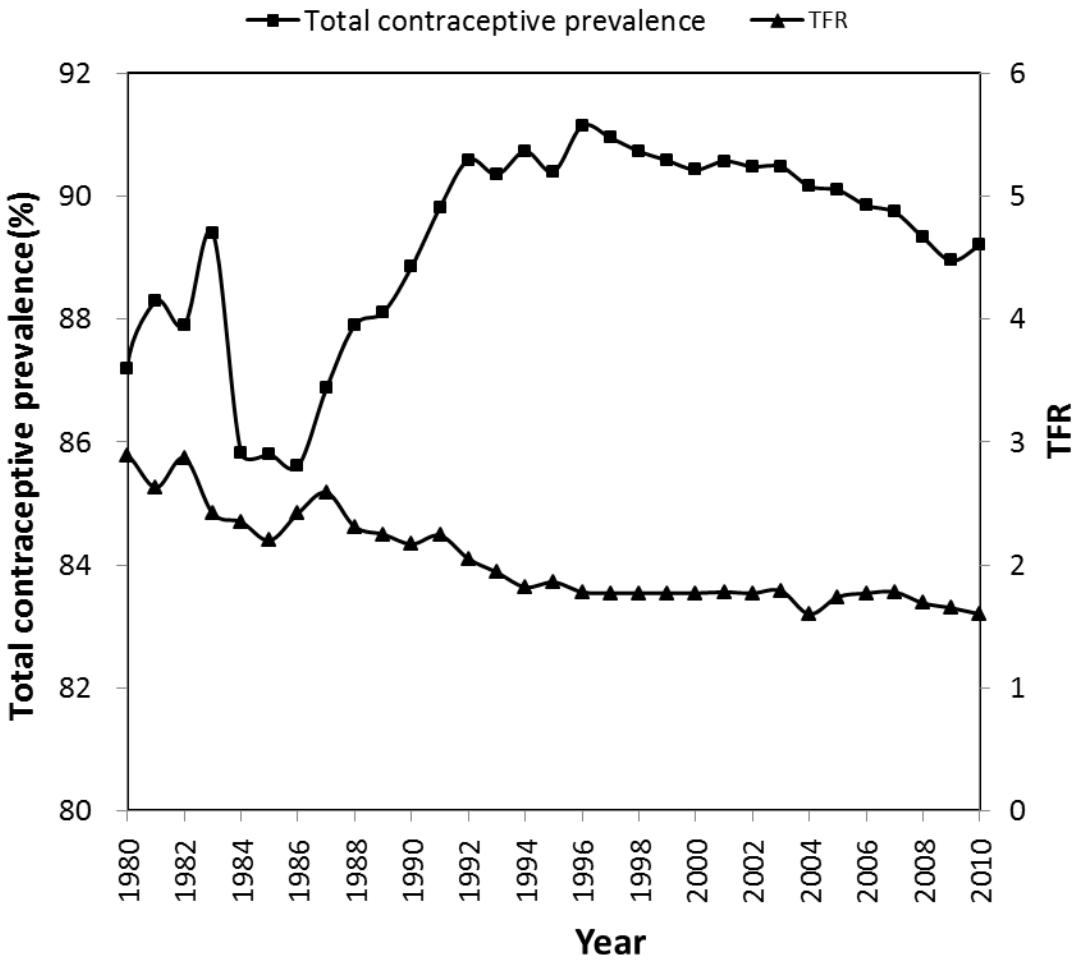

Fig. 1. Total contraceptive prevalence and TFR in China, 1980-2010 (%)

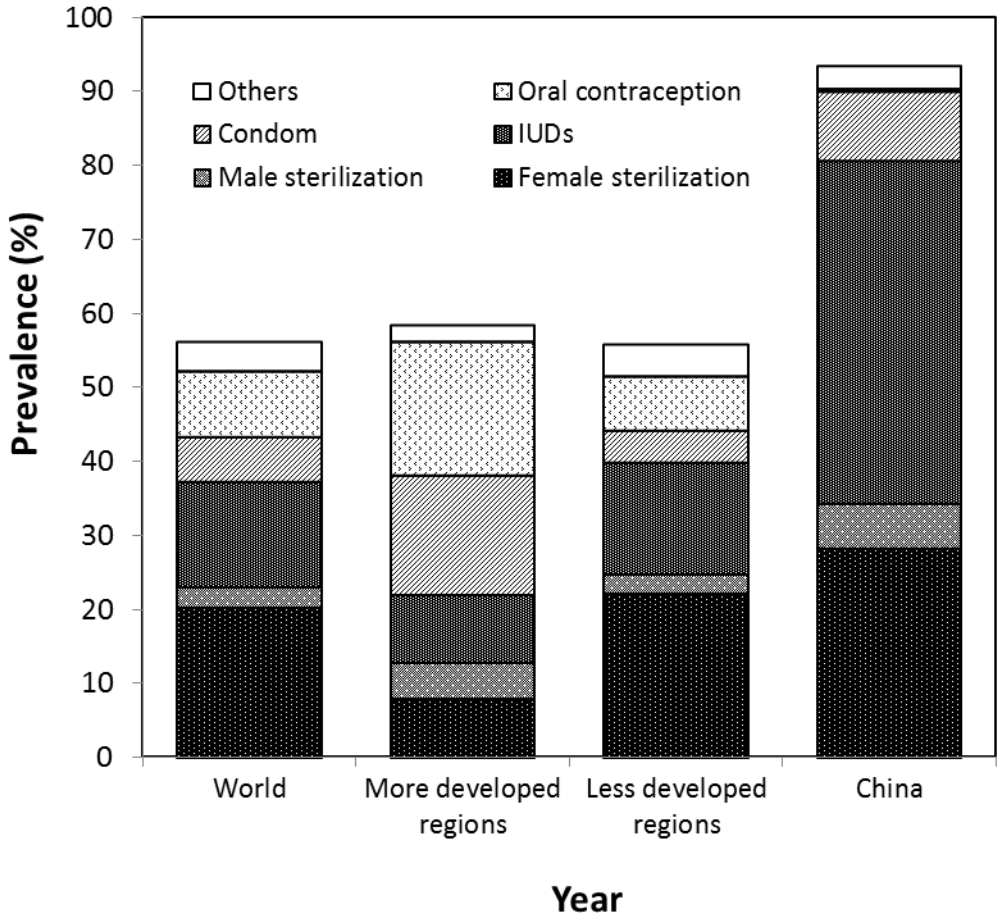

Fig. 2. Comparison of overall contraceptive prevalence between China and the world and major development groups in 2009 (%)

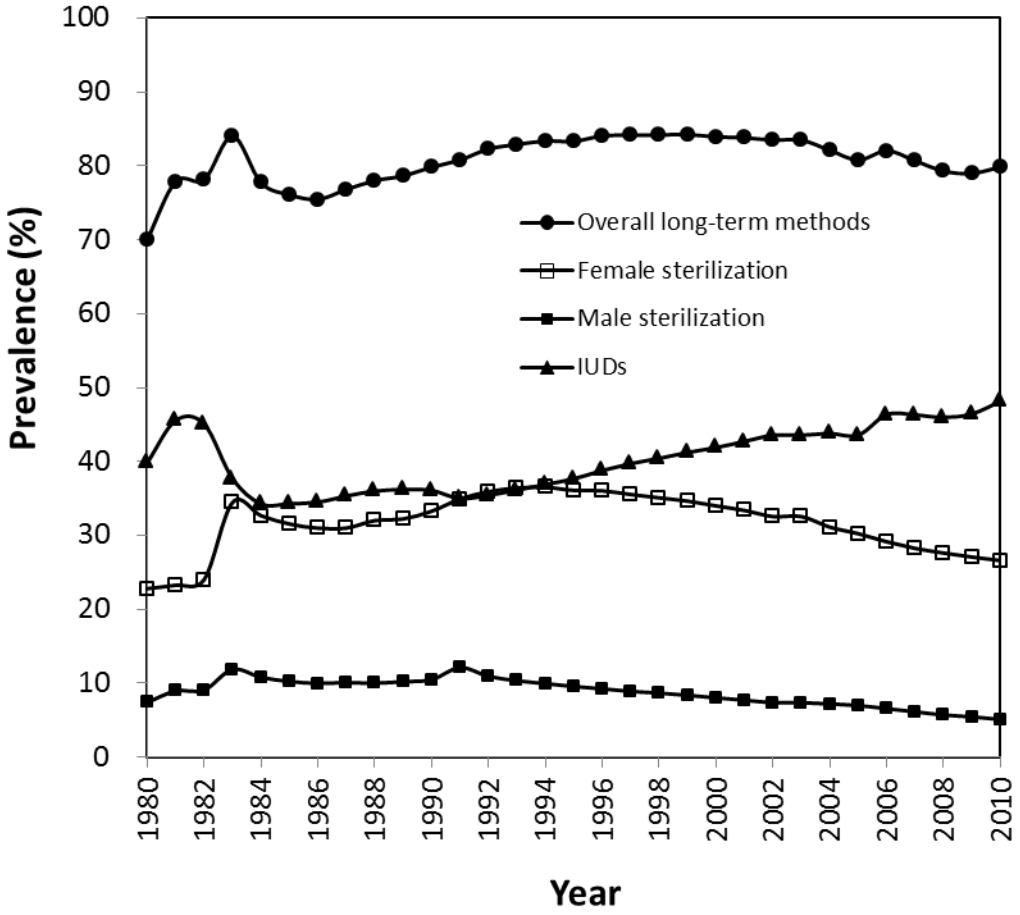

Fig. 3. Long-term contraception mode in married couples of reproductive age, 1980-2010 (%)

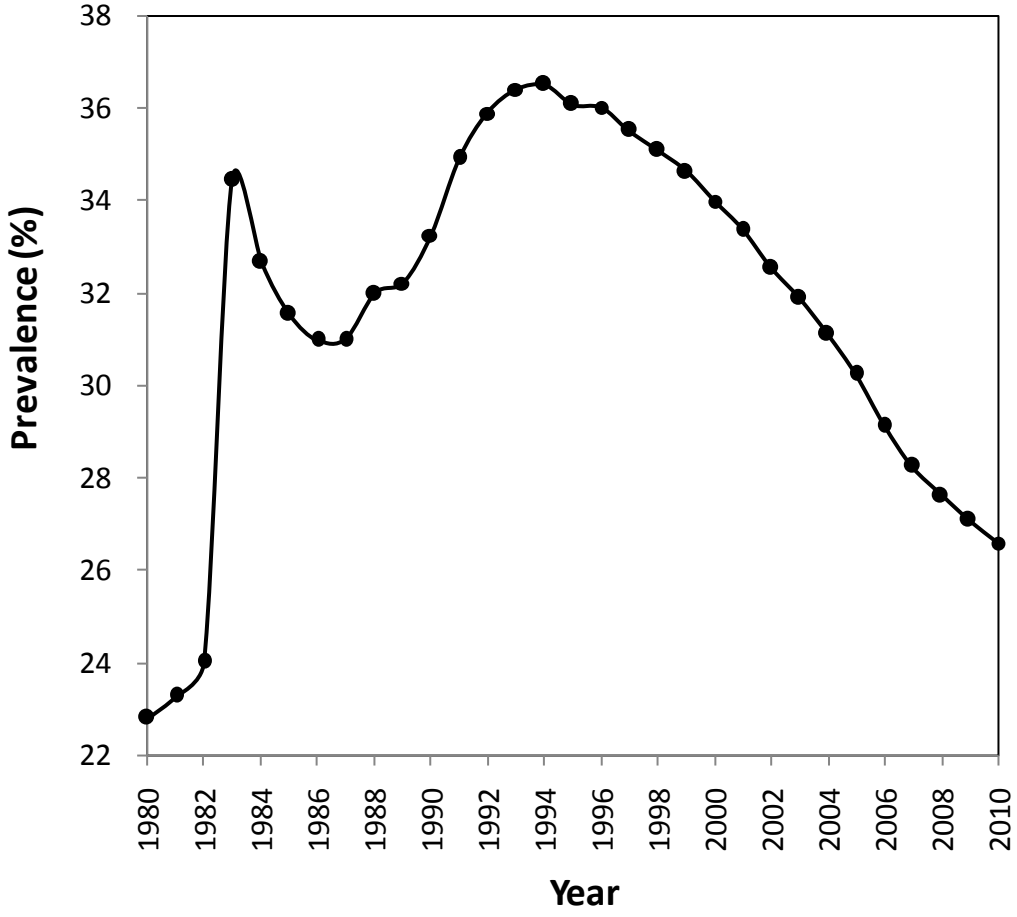

Fig. 4. Prevalence of female sterilization in married women of reproductive age in China, 1980-2010 (%)

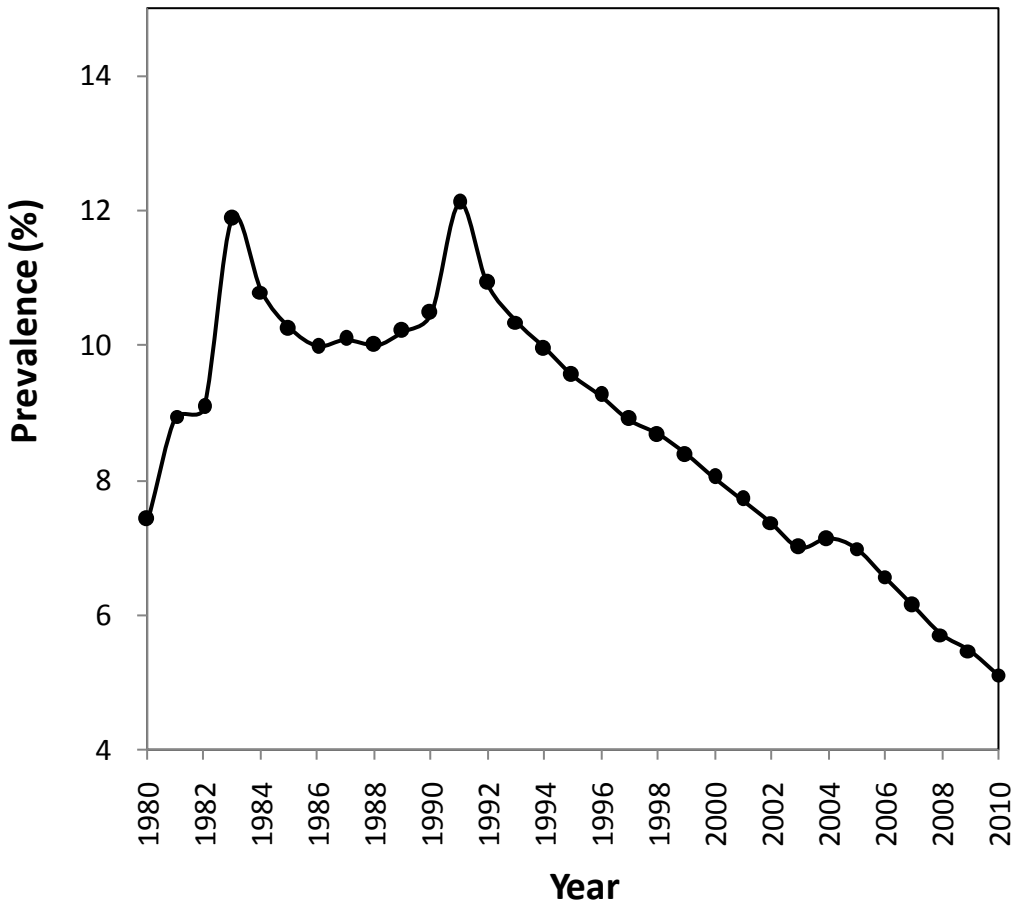

Fig. 5. Prevalence of male sterilization in married men of reproductive age in China, 1980-2010 (%)

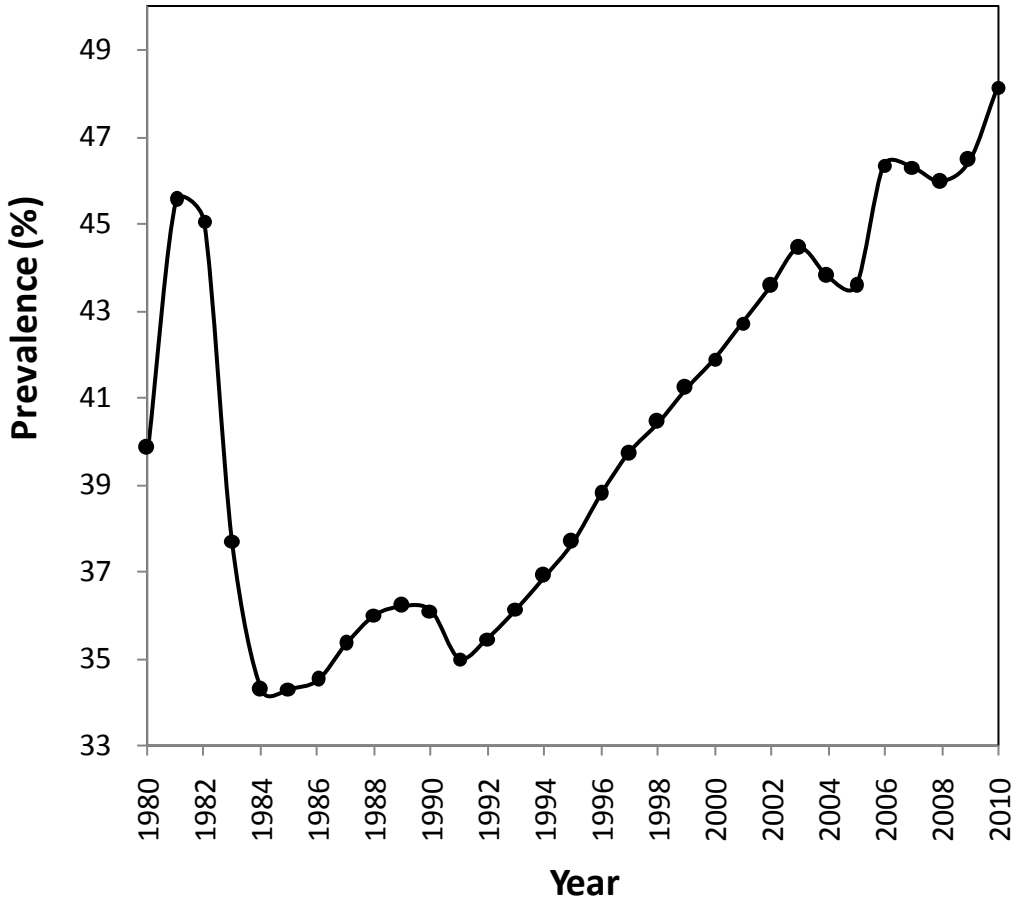

Fig. 6. Prevalence of IUD in married women of reproductive age in China, 1980-2010 (%)

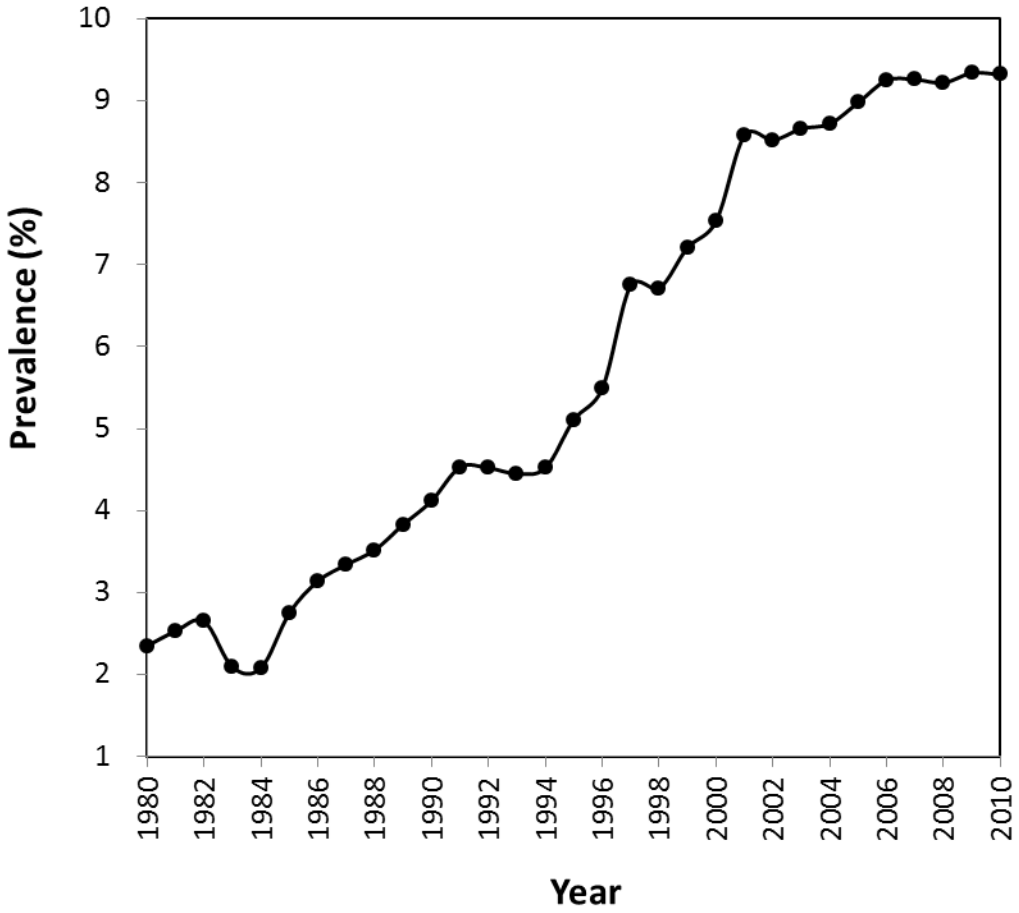

Fig. 7. Prevalence of condoms use in married couples of reproductive age in China, 1980-2010 (%)

Table 1

Percentage distribution of individuals' contraceptive choice under different strengths of family planning policies

Contraceptive choice	Strength degree of family planning policies		
	Tight	Moderate	Loose
Sterilization	45.90	40.99	33.74
IUD	36.27	38.71	41.84
Oral contraception	7.23	1.57	1.00
Condom	3.36	6.75	9.38
Others	1.93	2.46	3.24
None	5.31	9.52	10.80
Total	100	100	100

Table 2

Determinants of an individual's contraceptive choice outcomes (multinomial logit model, n=42,000)

Parameter	IUD		Oral contraception		Condom		Others	
	Odds ratio	(95% CI)	Odds ratio	(95% CI)	Odds ratio	(95% CI)	Odds ratio	(95% CI)
Ethnicity (base=Han)								
Non-Han	1.86***	(1.83-1.89)	2.97***	(2.91-3.04)	4.31***	(4.23-4.38)	2.80***	(2.69-2.91)
Number of living children (base=0)								
1	5.16***	(4.43-5.88)	0.38**	(0.33-0.43)	0.03**	(0.03-0.04)	0.02***	(0.02-0.02)
2	0.06***	(0.05-0.06)	0.01*	(0.00-0.01)	0.00	(0.00-0.00)	0.00*	(0.00-0.00)
≥ 3	0.04***	(0.03-0.04)	0.01*	(0.00-0.01)	0.00	(0.00-0.00)	0.00*	(0.00-0.00)
Education (base=primary and below)								
Middle school	1.55***	(1.53-1.57)	1.65**	(1.62-1.68)	1.34***	(1.32-1.36)	1.95***	(1.89-2.01)
High school	1.60***	(1.57-1.63)	1.58***	(1.54-1.63)	1.55***	(1.52-1.58)	2.41***	(2.32-2.50)
College and above	2.12***	(2.00-2.24)	1.55***	(1.43-1.68)	4.62***	(4.34-4.90)	3.94***	(3.66-4.21)
Hukou (base=rural)								
Urban	1.42***	(1.40-1.44)	1.92***	(1.88-1.95)	1.54***	(1.51-1.56)	3.71***	(3.60-3.81)
Region (base=east)								
Middle	1.02	(1.01-1.03)	0.81**	(0.79-0.83)	1.09**	(1.08-1.11)	0.73***	(0.71-0.76)
West	1.77***	(1.75-1.79)	2.23***	(2.18-2.27)	2.61***	(2.57-2.65)	2.03***	(1.98-2.09)
Age								

20-49	1.04*	(1.04-1.04)	1.03*	(1.03-1.03)	0.94**	(0.94-0.94)	1.06**	(1.06-1.06)
Sex of last living child (base=boy)								
Girl	1.17***	(1.16-1.18)	1.30***	(1.28-1.32)	1.55***	(1.54-1.57)	1.38***	(1.34-1.41)
Strength of family planning policies (base=tight)								
Moderate	1.31***	(1.30-1.32)	0.09**	(0.08-0.10)	1.22**	(1.22-1.23)	1.38***	(1.37-1.39)
Loose	1.57***	(1.56-1.57)	0.10***	(0.10-0.11)	1.48***	(1.48-1.48)	1.60***	(1.55-1.65)
Constant	2.89		4.71		4.63		6.75	

Note: (1) The reference group for dependent variables is sterilization. (2) Total model p=0.000 (log likelihood=-399916.07). (3) *p<0.10,**p<0.05,***p<0.01.