

Trends and Determinants of Contraceptive Method Choice in China

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Abstract: Contraception promotion is a crucial component of the family planning programme in China. Since the mid-1990s, state strategy has gradually shifted from demographic targets towards a client-centred, informed choice approach. Data for this study are drawn from six national Population and Family Planning surveys conducted during 1982–2006. Data from all six surveys are used for describing the trends in contraception use and changes in method mix over the last three decades. Data for individuals taken from the 2001 and 2006 surveys are applied to investigate the effect of changing strategies on parity-specific methods choices. Both individual and community level data from the 2006 survey are then used to examine the determinants of informed choice. Multilevel logistic regression models are fitted for each of the two outcomes. The results show that contraceptive prevalence rate among married women of reproductive age in China was over 70% in the 1980s and reached 80% in the 1990s, with the method mix dominated by sterilization and IUD. A shift towards increase in condom use and a decrease in sterilization was observed among new users between 1996–2001 and 2001–2006. The multilevel analysis shows that between 1996–2001 and 2001–2006, the proportion of users choosing methods “highly recommended” by providers of family planning services declined significantly. The provision of a mix of contraceptives by the community plays a positive role for informed choice. Although the historical top-down approach towards promoting long-acting methods has weakened over time, institutional forces continue to influence the method choices made by individuals. Enhancing community contraception provision and providing adequate counselling could benefit informed choice of contraception method and this, in turn, could contribute to improving women’s reproductive health.

Key words: Family Planning · Informed choices · China

1 Background

Contraception promotion is a crucial component of the family planning programme in China. For many years, IUD was “highly recommended” by providers of family

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planning services for spacing after the first birth, and sterilization was recommended after the second birth in order to limit the number of children born. Since the mid-1990s, the goal of the national family planning programme has shifted from an emphasis on demographic targets towards a client-centred approach and from a narrow focus on the overall prevalence of contraceptive use towards an integrated approach that takes into consideration wider issues of reproductive health and women's empowerment (NPFPC 2007; Xie 2011; Wang 2012a, 2012b). The Quality-of-Care initiative, which focuses on client needs, informed choice and better quality services, began as a small scale pilot project in the early 1990s and was scaled up to a national reform program after 2000 (Kaufman et al. 2006).

Globally, contraceptive use among married women of reproductive age has increased gradually in all developing countries since 1980. Towards 2000–2005, contraceptive prevalence had reached 66% in Asia, 73% in Latin America and the Caribbean, and 22% in Sub-Saharan Africa. In terms of method mix, the share of female sterilization rose from 29% to 39%; the share of IUD declined from 24% to 20%; the share of the pill dropped from 16% to 12%; the share of injectables rose from 2% to 8%; the share of condoms increased slightly from 6% to 7%; and the share of male sterilization remained below 3% (Seiber et al. 2007). The determinants of contraceptive use and method choice involve individual, cultural, fertility and contextual factors including family planning programme efforts (Magadi and Curtis 2003; Philips et al. 1988). Informed choice in family planning has been recognised as an important element of high quality reproductive health services (the Johns Hopkins School of Public Health 1989). The essential purpose of the informed choice process is to enable the client to make her/his own decision based on full and essential information, without any form of coercion or discrimination. A large body of research evidence support the finding that broadening the choice of contraceptive methods has a positive impact in increasing overall contraceptive prevalence (Philips et al. 1988; Jain 1989; Ross et al. 2001; Magadi and Curtis 2003). The provision of a wide range of contraceptive methods increases the opportunity for individual couples to obtain a method that suits their needs. The decision of a woman or a couple to use contraceptives or seek family planning advice is influenced by the community where they live. This has been found in studies conducted in countries such as India, Morocco and Bangladesh (Stephenson and Tsui 2002; Khan and Shaw 2011). Researchers have also found that women's social, economic and demographic characteristics are associated with their choice of contraceptive method (Steele et al. 1999). In China, studies show that sterilization and IUDs were the main methods married women used during the period 1988–2001. More educated women were more likely to choose IUDs, while the less educated were more likely to choose sterilization. Women in urban areas were more likely to choose IUDs and condoms, while those in rural areas were more likely to choose sterilization (Wang 2012b; Ren and Zheng 2006). A formal evaluation of the impact of the Quality-of-Care intervention in 30 pilot counties found that, between 2003 and 2005, there were reductions in the prevalence of methods recommended by the programme, but family planning workers continued to influence the choices women made (Brown et al. 2010).

To date, there has been a lack of systematic national-level analysis evaluating

the impact of China's Quality-of-Care initiative on women's contraceptive behaviour with respect to method mix and informed choice. Of the limited studies that have been conducted, some were unable to determine the specific date when a woman began using a particular contraceptive method and thus failed to capture the behaviour change precisely (Ren and Zheng 2006; Wang 2012b). Other studies failed to explore the contextual effects that were not readily observable (Reng et al. 2003; Zhang 2007). This study, therefore, aims to address these gaps by: (1) generating statistical evidence of changes in method mix over time; (2) examining the effects of new client centred strategies on method mix, in particular focusing on changes in methods uptake recommended by the family planning programme; and (3) disentangling the individual and contextual determinants of contraceptive choices.

2 Data and method

This section describes the data sources, analytical approach, and measurements considered in the study.

2.1 Data

Data for the analysis are drawn from six national Population and Family Planning Surveys for the period 1982–2006. The surveys (the names of which differ) were conducted in 1982, 1988, 1992, 1997, 2001 and 2006 by the State Family Planning Commission of China. The main purpose of these surveys was to collect data on fertility, contraceptive use and other reproductive health issues of women of reproductive ages (15–49). Retrospective full birth history information was available in all of the surveys, with the notable exception of the 1992 survey, which recorded birth histories for only the last four children. All surveys were designed to be nationally representative, except for Tibet excluded in the 1982 and 2006 surveys. Thus, for this study, Tibet was excluded from the analysis. The quality of this set of data has been systematically assessed and determined to be high quality and consistent (Qin 2016). However, the list of questions varied across different surveys. For instance, a question concerning the date of contraceptive method use appeared only in the 2001 and 2006 surveys. Both individual and community-level data for the whole country were available only in the 2006 survey.

2.2 Method

In order to address the first objective, all six surveys were used to provide a descriptive overview of trends in contraceptive use and the changes in method mix.

For the second objective, individual data from the 2001 and 2006 surveys were used to investigate the extent to which the uptake of parity-specific methods among women were influenced by the family planning programme. The analysis considered 32409 then married women out of a total of 39508 women from the 2001 survey. Of these married women, 28171 were users of contraception at the time of

the survey. To capture the change of method choices, the sample was then further limited to include only those users who had commenced using a method between June 1996 and July 2001 (the five-year period prior to the survey date). Women with no children (276 women) were excluded since they were not usually targeted by family planning programme and because they were unlikely to use long-acting methods. The final sample considered 9492 users; of these, 5960 were at parity one and the rest of the users were at parity two or higher. A similar data selection procedure was then applied to the 2006 survey. For the analysis, 28582 currently married women were selected from a total of 33257 women. Of these, 24176 were users of contraception at the time of the survey. Only 7611 women who had started using a method between August 2001 and September 2006 (the five-year period prior to the survey) were considered for the analysis. Women with no children (229 women) were excluded. This selection procedure yielded a dataset of 7382 users, with 4683 at parity one and the rest at parity two or higher.

Multilevel logistic regression models were fitted to account for potential heterogeneity of individual contraceptive choice behaviour across sampled clusters or communities. The reasons for using a multilevel model were twofold. First, the data used for the analysis had a hierarchical structure, with women being selected from households nested within communities within counties within provinces. The family planning programme service delivery exists at all of these administrative levels. Second, China's family planning programme is managed as a top-down process. Thus the factors at the community, county, and provincial levels all influence a woman's choice of contraception. A study based on the analysis of Bangladesh Demographic and Health Survey data illustrated the tendency for a standard logistic model to seriously bias the parameter estimates of observed covariates when analysing multilevel data (Khan and Shaw 2011). To capture the influence of the hierarchical structure of family planning services delivery, a multilevel approach was considered that allowed integrating variables measured at different levels with unobserved exogenous effects, such as the beliefs regarding contraceptive use.

The models take the form of four-level models with women (level 1) nested within communities (level 2), nested within counties (level 3), nested within provinces (level 4). The model can be specified as:

$$\text{logit}(P_{ijkm}) = \beta_0 + \beta_1 t_{ijkm} + \beta_1 X_{ijkm} + \cdots + \beta_p X_{pijkm} + \delta_1 Z_{ijkm} + \delta_2 Z_{km} + \delta_3 Z_m + u_{0ijkm} + v_{0km} + w_{0m} \quad (1)$$

where subscripts i, j, k, m refer to level 1, level 2, level 3 and level 4, respectively, t_{ijkm} is a dummy variable that distinguishes two time periods, x variables refer to the characteristics of a woman, z variables capture the context effect at each level, with $u, v,$ and w normally distributed random effects capturing the exogenous unobserved factors at each level. The outcome of main interest was the random effect W_{0m} and its associated variance σ_m^2 as a measure of the influence of the family planning programme on method choices. This effect was expected to be crucial for explaining the way in which the family planning programme operated in China. However, it was also assumed that this effect would weaken over time with the move towards an informed-choices approach. An effort to

capture the changing pattern of influence was made by allowing σ_m^2 to be different for the two time periods – introducing a covariance term for the second time period.

First, separate models applied to the 2001 survey and 2006 survey data were fitted by parity, with the outcomes based on the method recommended by the providers of family planning services for a woman's parity; that is, IUD use at parity one and sterilization at higher parities. Initial analysis showed some of the main effects to be similar, and hence the models were combined with the inclusion of appropriate interactions. The fixed-effect model was then extended to incorporate the hierarchical structure of the data; women within communities within counties within provinces.

Outcome variable of Model (1): for parity-one women, a response variable was created that contrasted IUD use with use of all other methods and at parity two or higher, a response variable was created that contrasted the use of sterilization with the use of all other methods.

The explanatory variables were selected based on existing literature. The analysis considered demographic characteristics (age, parity, year of marriage) and socio-economic characteristics (education, ethnicity, rural-urban residence, and region) of the woman. A dummy variable was included to distinguish between the two time periods covered by the surveys in order to measure the overall change across time. The provincial level in the multilevel analysis was of interest because activities related to family planning policy were regulated at this level throughout China.

For the third objective, both individual and community-level data from the 2006 survey were used to examine the community variables that influence the informed choice approach to contraceptive method selection. Community data from the 2006 survey was merged with the individual dataset that included a sample of 7368 users. To select this sample, the procedure was similar to that described above for multilevel analysis I. We considered the sample of 7611 women who were married and reported using contraceptives at the time of the survey, and who had begun using contraceptives during the five-year period prior to the survey (including those women with no children). Of the 7611 women, we excluded 243 for which the values for community variables were not available. This selection process yielded a sample of 7368 users.

The multilevel logistic model can be expressed as:

$$\text{logit}(P_{ijkm}) = \beta_0 + \beta_1 X_{1ijkm} + \cdots + \beta_p X_{pijkm} + \delta_1 Z_{jkm} + \delta_2 Z_{km} + \delta_3 Z_m + u_{0ijkm} + v_{0okm} + W_{0m} \quad (2)$$

Since only one survey was used for this stage of the analysis, there was no time dummy variable. The rest of items were the same as those in Model (1).

The outcome variable of Model (2) was whether a woman reported making an informed choice of contraceptive method or not. In this study, informed choice was defined as an individual contraceptive behaviour when a woman using a method reports that the (current) method was chosen by either herself or jointly in consultation with her spouse and that she was aware of any side effects associated with the method at the time of choosing the method. If the method was chosen by a family planning worker or others and not by her (or jointly with her spouse), or that the woman reported that she did not understand the potential side effects of her

(current) contraceptive method then there was no informed choices.

The explanatory variables for Model (2) included not only demographic and socio-economic characteristics of the women in the sample, but also a community-level variable concerning the provision of contraception. This variable was measured based on a score variable constructed from responses to six questions regarding six types of contraception provision (condom, diaphragms, three types of oral pills and emergency pill) in the community. The response options were yes or no. A score of 1 was given to the “yes” response and of 0 to the “no” response to each question. The scores for the six questions were then summed and recoded as 1 if the sum for the six responses was lower than 3 reflecting a relatively limited method mix in contraception provision, and recoded as 2 if the sum was higher than 3 reflecting a relatively more varied mix in contraception provision.

After fitting the models, the assumptions about random effects for both sets of multilevel logistic models were evaluated using normal probability plots for the individual, community, county and provincial level residuals. The statistical software MLwiN 2.32 was used for the multilevel modelling (Rasbash et al. 2009).

3 Results: Trends in contraceptive prevalence and method choice 1982–2006

Figure 1 shows the trends in contraceptive use by method among married women of reproductive ages in China during the years 1982 to 2006. Overall, contraceptive use among married women was high, increasing from 71% in 1982 to over 80% after the 1990s. The proportion of married women receiving sterilization increased from 35% in 1982 to 54% in 1992, and then steadily declined to 39% in 2006. In contrast, the use of IUD steadily decreased from 50% in 1982 to 40% in 1992, and then increased to 48% in 2006. Interestingly, the proportion of women using the oral pill declined over time, from 8% in 1982 to just 1% in 2006; whilst condom use increased from 2% in 1982 to 10% in 2006. These trends

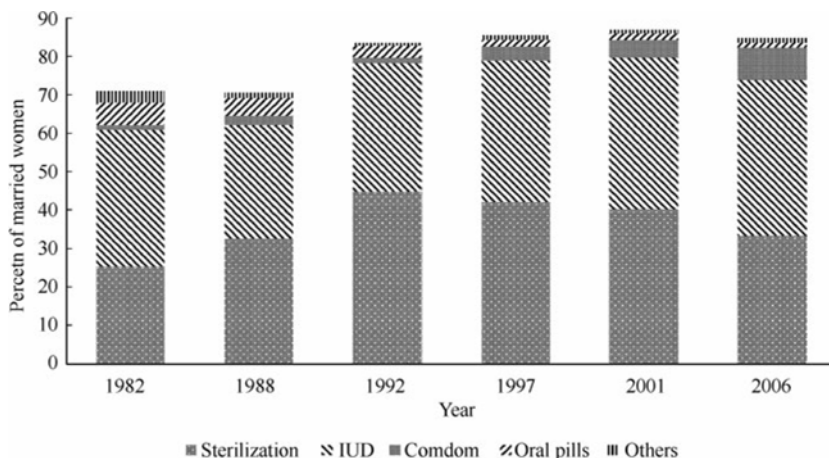


Figure 1 Trends in Contraceptive Method Choice among Married Women Aged 15–49 by Survey Year, China 1982–2006

clearly show sterilization and IUD dominated method mix in China. However, in the last two decades, sterilization has become less common, whilst IUD use has continued to remain the dominant method. Moreover, there has been a shift from oral pill to condom use.

Contraceptive prevalence rates among different groups of women are shown in Table 1. Group I includes urban residents nationwide; Group II includes rural residents in 6 provinces or provincial-level municipalities (Beijing, Tianjin, Shanghai, Jiangsu, Sichuan and Chongqing); Group III includes rural residents in 19 provinces (Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Guizhou, Shaanxi and Gansu); and Group IV includes rural residents in 5 provinces (Hainan, Yunnan, Qinghai, Ningxia and Xinjiang). The need for analytical tools to evaluate the principal types of differentiated family planning policies implemented from 1984 onwards prompted the development of this classification scheme (Gu et al. 2007). It is clear that, over time, family planning programme in China has virtually extended to all sub-groups of women, indicating widespread use of contraceptive measures by the general population.

Table 1 Contraceptive Prevalence Rate among Married Women Aged 15–49 by Groups, 1982–2006

Groups	1982	1988	1992	1997	2001	2006
I	76.0	77.3	84.0	82.4	87.3	85.0
II	80.2	77.9	85.9	85.2	87.9	84.1
III	69.9	70.8	84.1	85.3	87.4	84.9
IV	38.7	50.4	67.9	68.8	75.9	80.1

Calculated from 1982, 1988, 1992, 1997, 2001 and 2006 surveys

4 Factors associated with the use of programme promoted methods

Over the past two decades, there has been a clear shift in the use of contraceptive methods away from those traditionally encouraged by the family planning programme towards condom use at parity one and IUD use at parity two (Table 2). The percentage distribution of new users adopting methods formally promoted by the family planning programme (IUD after the first birth or sterilisation after the second) by selected variables between 1996–2001 and 2001–2006 is shown in Table 3. The unadjusted figures show that there was a 13% reduction in the choice of programme recommended methods between the period 1996–2001 and the period 2001–2006 (from 76.4% to 63.5%). Over the study period, the reduction in the choice of programme recommended methods was observed across individual groups of different ages, education levels and ethnicity, and among residents of both urban and rural areas and people from different regions (Table 3). The ability of family planning workers to influence women or couples in the choice of contraception method persisted. There is, however, evidence that more couples were choosing the contraception method themselves. Amongst those using a programmed method, the percentage

Table 2 Choice of Contraceptive Method among New Users by Parity (%) in China from 1996–2001 and from 2001–2006

Method	2001–2006 (<i>n</i> = 7382)			1996–2001 (<i>n</i> = 9492)		
	Overall	Parity one	Parity two or higher	Overall	Parity one	Parity two or higher
IUD	58.2	80.7	24.0	52.5	66.9	31.3
Sterilization (women)	21.7	1.1	58.0	18.6	0.6	51.3
Sterilization (men)	4.1	0.1	11.2	2.2	0.1	6.1
Condom	10.4	12.3	2.7	36.7	27.4	7.3
Oral pill	3.4	3.8	2.1	3.0	2.8	1.9
Other	2.1	2.0	2.1	2.1	2.2	2.1
Total women	9492	5960	3532	7382	4683	2699

Data source: 2001 and 2006 surveys

Table 3 Percentage of New Users Adopting Programme-Promoted Methods^a by Selected Variables, China 1996–2001 and 2001–2006

Variables	1996–2001		2001–2006	
	Per cent	No. of women	Per cent	No. of women
All	76.4	9492	63.5	7382
Motivator for choice of method¹				
Woman	71.0	4061	61.4	3070
Couple	62.8	1260	59.9	2989
Family planning worker	89.5	3235	83.0	984
Other (including health professionals)	72.6	936	57.2	339
Current age (in years)				
15–24	85.4	1110	70.5	1017
25–34	78.9	6765	66.7	4659
35–49	59.2	1617	50.5	1706
Year of marriage				
Pre–1994	69.6	5189	50.4	1860
1995–1999	84.7	4081	64.2	2025
Post–1999	78.8	222	70.0	3497
Parity				
1	80.7	5960	66.9	4683
2+	69.1	3532	57.4	2699
Woman's education				
Primary or less	78.4	4081	68.8	2145
Lower middle school	78.9	3911	65.5	3566
Upper middle school and above	64.0	1500	52.1	1671
Woman's ethnicity				
Han	78.1	8468	64.1	6475
Non-Han	62.2	1024	58.7	907
Residence				
Urban	63.8	2331	44.7	2419
Rural	80.4	7161	55.3	4963
Region				
Eastern	76.9	3649	59.2	3071
Central	81.7	2902	72.2	2309
Western	70.3	2941	59.9	2002

Data source: 2001 and 2006 surveys

^aRefers to IUD use at parity one or sterilization at higher parities

1 This variable was based on the survey question and response options: "Who chose the current method? ① Woman herself; ② Spouse; ③ Couple; ④ Other family member/relative or friend; ⑤ A health care professional; ⑥ Family planning worker; ⑦ Other person or people". The four categories of the variable were woman (option ①), couple (option ③), family planning worker (option ⑥) and others (options ②, ④, ⑤ or ⑦).

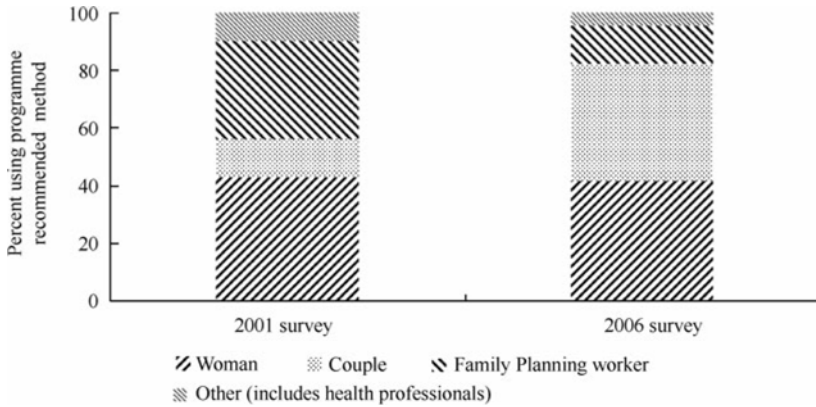


Figure 2 Source of Motivation for the Choice of Contraceptive Method among New Users in China from 1996 –2001 and from 2001 –2006
 Data source: 2001 and 2006 surveys

of women reporting that their choice was influenced by a family planning worker fell by 21% between the period 1996 –2001 and 2001 –2006 (Figure 2).

Regression analysis in Table 4 shows the effect of the explanatory variables from the multilevel logistic model in predicting whether or not a woman’s choice of method was the one traditionally promoted by the family planning programme for her parity. The null model (without any covariate) was estimated first. The residual variance of level 2, level 3 and level 4 were significant, indicating the need for multilevel modelling. The odds of a woman choosing a programme promoted method changed significantly over time as shown by the odds ratio of 0.60 for new users who chose a programme promoted method in the five years prior to 2006 relative to those who did so in the five years prior to 2001. The variance parameters for the variables analysed are also shown in Table 4. The random-effect variances were significant at the community, county and provincial levels. Usually, variances decreased at higher levels when the variables represented nested levels of geographic clustering. However, the results show that in this case the provincial level variance was the largest, while the covariance term at the provincial level was not significant, suggesting that there was no evidence of any change in the random-effect distribution between the two time periods.

The estimated odds ratios from different motivators by parity (based on interaction terms in Table 4) for using a programme recommended method among Han and non-Han ethnic groups are shown in the Appendix Table 6. At both parity one and parity two, the odds of choosing a programme recommended method were higher for women whose decisions were influenced by a family planning worker than for women making choices on their own. In general, programme recommended methods were less popular at higher parities, as shown by the odds ratio of 0.12 for women of parity two or higher using sterilization relative to women of parity one using IUD. Results from Table 4 also show that those who had married most recently were more likely to choose the programme recommended method than those who had married

earlier. The effect of a woman's education level is what one would expect: women with lower levels of education were more likely to use programme recommended methods. Women living in rural areas and those living in China's central region were more likely to select a programme recommended method than those living in urban areas or in the western or eastern regions of China.

Table 4 Odds of Using a Programme Recommended Method^b with Unadjusted Percentages in China from 1996–2001 and from 2001–2006 (results of four levels of logistic regression) ($n = 16874$)

Variables	Odds ratio [95 per cent CI]	Unadjusted percentage (n)
Fixed effects		
Survey		
2001	1.00	76.4 (9492)
2006	0.60 [0.38, 0.94] *	63.5 (7382)
Motivator for choice of method		
Woman	1.00	66.8 (7131)
Couple	0.40 [0.35, 0.46] ***	60.7 (4249)
Family planning worker	1.92 [1.57, 2.33] ***	88.0 (4219)
Other (including health professionals)	0.55 [0.46, 0.66] ***	68.6 (1275)
Current age (in years)		
15–24	1.00	78.3 (2127)
25–34	1.23 [1.05, 1.44] **	74.0 (11424)
35–49	0.77 [0.63, 0.94] **	54.8 (3323)
Year of marriage		
Pre–1994	1.00	64.6 (7049)
1995–1999	1.32 [1.18, 1.49] ***	77.9 (6106)
Post–1999	1.30 [1.09, 1.55] **	70.5 (3719)
Parity		
1	1.00	74.6 (10643)
2+	0.12 [0.10, 0.14] ***	64.1 (6231)
Woman's education		
Primary or less	1.00	75.2 (6226)
Lower middle school	0.89 [0.77, 1.02]	72.5 (7477)
Upper middle school and above	0.60 [0.48, 0.74] ***	57.7 (3171)
Woman's ethnicity		
Han	1.00	72.0 (14943)
Non–Han	1.40 [1.11, 1.78] **	60.7 (1931)
Residence		
Urban	1.00	59.5 (4750)
Rural	2.10 [1.86, 2.36] ***	75.1 (12124)
Region		
Eastern	1.00	68.8 (6720)
Central	1.77 [1.00, 3.12] *	77.5 (5211)
Western	1.35 [0.80, 2.29]	66.3 (4943)
Interactions		
Parity2 + x Non–Han	0.32 [0.24, 0.42] ***	44.5 (1010)
Parity2 + x Couple	6.82 [5.50, 8.46] ***	64.6 (1613)
Parity2 + x FP worker	3.42 [2.60, 4.50] ***	84.3 (2095)
Parity2 + x Other	4.06 [2.85, 5.77] ***	63.8 (414)
Random effects		
Null model without covariates		Model with covariates
Provincial level variance and standard error	0.93 (0.21) ***	0.61 (0.19) ***
Covariance and standard error		–0.03 (0.14)
County level variance and standard error	0.64 (0.08) ***	0.57 (0.07) ***
Community level variance and standard error	0.42 (0.04) ***	0.40 (0.05) ***

Data source: 2001 and 2006 surveys

^bRefers to IUD use at parity one or sterilization at higher parities.

CI: Confidence Interval; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

5 Determinants of informed method choice

The parameter estimates from the multilevel multivariate model of the determinants of informed choice of method are presented in Table 5. The null model was estimated first. The residual variances of level 2 and level 3 were significant. The analysis shows that after controlling for women's individual characteristics, the degree of variation in contraception provision available in the community played an important role. The odds of making an informed choice of contraception amongst women living in a community where more than three types of contraception were available was 1.5 times greater than those of women living in a community with only a limited method mix available. The type of method itself had influence on the likelihood of informed choice. Compared to those who chose IUD, new users who chose a condom had significantly higher odds of making an informed choice, while those who chose sterilization had lower odds of making an informed choice. The effects of other individual

Table 5 Odds of Informed Choice of Contraception^c
(results for four levels of logistic regression) ($n=7368$)

Variables	OR (95 per cent CI)	Unadjusted percentage (n)
Fixed effects		
Current age		
15–24 (ref)	1.00	61.6 (1052)
25–34	1.22 [1.02, 1.44] *	62.4 (4644)
35–49	1.15 [0.93, 1.41]	58.9 (1672)
Ethnicity		
Han (ref)	1.00	60.6 (6454)
Non-Han	1.20 [0.91, 1.58]	68.1 (914)
Education		
Primary or less (ref)	1.00	48.0 (2141)
Lower middle school	1.64 [1.42, 1.89] ***	62.1 (3565)
Upper middle school and above	3.00 [2.42, 3.71] ***	77.4 (1667)
Residence		
Urban (ref)	1.00	70.4 (2352)
Rural	0.97 [0.78, 1.21] *	57.3 (5016)
Region		
Eastern (ref)	1.00	67.0 (3085)
Central	0.55 [0.38, 0.78] ***	53.6 (2273)
Western	0.71 [0.49, 1.04]	61.9 (2010)
Contraception		
IUD (ref)	1.00	62.2 (3878)
Male/female sterilization		
Condom	1.57 [1.33, 1.85] ***	74.5 (1574)
Others	1.45 [1.08, 1.94] *	71.7 (346)
Types of methods provided by community		
Less than 3 (ref)	1.00	53.4 (1866)
More than 3	1.48 [1.19, 1.85] ***	64.2 (5502)
Random effects		
Provincial level variance and standard error	Null model without covariates 0.16 (0.1)	Model with covariates 0.02 (0.04)
County level variance and standard error	0.62 (0.13) ***	0.36 (0.09) ***
Community level variance and standard error	1.05 (0.09) ***	1.01 (0.09) ***

Data source: 2006 survey

^cRefers to woman who made an informed choice of contraception method, against those who did not make informed choice

CI: Confidence Interval; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

characteristics were as expected. Women with higher education levels had higher odds of making an informed choice than those with lower education levels. Rural residents had lower odds than their urban counterparts. Women living in China's central region had the lowest odds of making an informed choice of the method of contraception, as compared with those living in China's eastern and western regions. In contrast to the results for model (1) (Table 4), it was found that community level variance was greater than the county level and provincial level variance (Table 5), highlighting the importance of implementation of the informed choice approach at the local level.

The assumptions about random effects were validated for multilevel logistic model (1) and model (2), using normal probability plots for individual, community, county and provincial level residuals (Rasbash et al. 2009). The results confirmed the normality assumption.

6 Discussion

The results show that contraceptive prevalence among married women of reproductive age had increased from a high level of 70% in the 1980s to an even higher level of 80% by the 1990s. The contraceptive prevalence rate in China is much higher than that of other developing regions; 66% in Asia, 73% in Latin America and the Caribbean, and only 22% in Sub-Saharan Africa during the years 2000–2005 (Seiber et al. 2007). High contraception prevalence in China is inversely associated with a rapid fertility decline, which owes much to China's social and economic development and the government's family planning policy (Li 2009). Our results also demonstrate that sterilization and IUD have remained the most popular methods in China over time, though sterilization has become slightly less prevalent since the 1990s. The proportions of users relying on female sterilization and IUD were 42% and 20%, respectively, in Asia as a whole in 2000–2005 (Seiber et al. 2007); the corresponding figures in China were 39% and 48%, respectively, for the same time period.

The underlying mechanisms that may explain the consistently high level of sterilization and IUD use are probably related to the fact that strict birth control regulations in China allowed the majority women to have only one or two children during their entire reproductive lifespan. Most Chinese women finish childbearing by their early thirties and rely on methods to prevent unwanted pregnancy. In such circumstances, long-acting, effective method such as female sterilization and IUD maybe the sensible choice. The data also show a steady increase of condom use in China. This change in contraceptive behaviour could reflect a more individualized selection of methods. This change could also be the result of demographic changes that show an overall increase in education rates among the general population and the significant growth of China's urban population during the years 1982 to 2006. Previous studies have found that women with higher education levels living in urban areas are more likely to choose condom or other short-term methods (Wang 2010b). Understanding shifts in contraceptive method choice is important to help policymakers and programme managers meet current contraceptive demand and anticipate future

needs.

A comparison of the results for “new users” for the study periods 1996–2001 and 2001–2006 show that there has been an increase in condom use after the first birth and in IUD use after the second birth. Both of these shifts represent moves away from the methods traditionally promoted by China’s family planning programme at these parities. The study found that women using a programme recommended method fell significantly between the earlier and later study periods, even after controlling for parity, age, year of marriage, motivator for the choice of method, and other social variables. This suggests that the national Quality-of-Care reform initiative has been generally successful in moving towards client-centred family planning services based on the principle of enabling users to make an informed choice of method. This observation is also supported by evidence that more women and couples are making their own choice of method, rather than having the choice made by family planning workers. More women also have an understanding of the method they chose, both in terms of their features and side effects, indicating that women are benefitting from method counselling. However, our results also suggest that the rigid, top-down management to family planning programmes is still, to some extent, in place. Family planning workers still have some influence in promoting the use of programme recommended methods. The above findings are highly consistent with a previous study conducted in the pilot sites (Brown et al. 2010).

Furthermore, our analysis highlights that contraception provision and local method mix also play an important role for informed choice. Women living in communities with a wider choice of methods had higher odds of making an informed choice than those living in communities with less varied method provision, after controlling for women’s individual characteristics. A wide range of contraceptive provision might also be linked to greater exposure to family planning information, counselling and interpersonal communication, all of which help to inform clients about the range of contraceptives available to them and enable them to make their own informed choice of the method they wish to use (Philips et al. 1988; Liu 2004; Wu 2008b). Interestingly, sterilization users had less informed choices than users of IUD. The explanation for this may be that sterilization is likely to be the choice promoted by family planning workers; and that women undergoing sterilization often lack the counselling needed to understand sterilization surgery and associated side effects. Women living in the central region have the lowest odds of making an informed choice of contraception method, compared to those living in eastern and western region. This is probably the case because the roll out of Quality-of-Care family planning services has moved slowly in the central region. The results therefore highlight the need for further programme interventions, such as enhanced method choice counselling. Moreover, additional efforts need to be focused on the provinces within the central region.

Promoting access to contraceptives has been acknowledged as an effective way to lower fertility rates and achieves sexual and reproductive health in developing countries (Tsui and Bogue 1978; Hardee et al. 2004; Bongaarts and Sinding

2011; WHO 2014). The notion that an informed and voluntary decision making process is desirable is not new. Informed, voluntary decision making requires service options to be available; the decision-making process to be voluntary; individuals to have access to appropriate information; an environment facilitating effective client-provider interactions including counselling; and the existence of a social and political context that supports autonomous decision making (WHO 2014). China's earlier family planning programme was driven by demographic considerations; service quality and client care were generally not high priorities. Since the 1990s, in response to the Programme of Action adopted at the International Conference on Population and Development in 1994, national programmes have refocused their efforts away from demographic targets and towards quality of care. Goals designed to deliver better care have been developed on the basis of a client-centred philosophy, with service upgrades, comprehensive retraining of family planning personnel and improvements to facilities all prioritized (Xie 2011).

The Quality-of-Care pilot programme for family planning services in China started in the early 1990s. The initial small scale pilot project was scaled up to a national reform programme in the 2000s (Kaufman et al. 2006). This paper presents robust evidence that the client-centred programme has broadened women's contraceptive choices, leading to more women making informed choices and receiving counselling. However despite considerable advances in the direction of informed and voluntary decision making in contraception choices, many women are still not in a position to make informed, voluntary choices about contraception. Women with less education, those living in rural areas and those living in the central region are less likely to make informed choices than women with more education, and women living in urban areas or in the western or eastern regions of China. Because the majority of contraceptives are provided free of charge in China, cost is not a principal determinant of an individual's choice of method. Barriers to informed and voluntary decision making persist for many reproductive health care clients as a result of local regulations, service delivery practices, resource constraints (inadequate counselling), and the attitudes of service providers (Wu 2008a; Kaufman et al. 2006).

The present study is the first of its kind in China to use a dataset representative of China's population as a whole to examine the effects of reforms of the family planning programme on the quality of care. The refocusing of family planning efforts to client needs, informed choice and better quality services began in the mid-1990s with a small scale pilot project and was scaled up to a national reform programme after 2000. The multivariate analysis used in this study compares data from 1996–2001 and 2001–2006 and is, thus, able to capture the effect of changes in family planning programmes on the behaviour of women with respect to their choices contraceptive method. However, given the cross sectional characteristics of the data set, we could not precisely compare women exposed to the Quality-of-Care programme for family planning services and those not exposed to the programme. Instead, we could only roughly divide women into two comparison groups who chose contraceptive method during two different time periods; and the scaled Quality-of-Care programme for family planning

services occurred in the second time period. Future research should consider using panel data to compare women exposed to the reformed programme and those not exposed to examine such influences. The surveys used in this study presented data on contraception use for married women only. Future surveys should also consider men, as well as adolescent and young women. Adolescent and young women generally have less access than older individuals to family planning services, and male participation in the family planning process has influenced the contraception decision making (Mason and Smith 2000).

Appendix

Table 6 The Estimated Odds Ratios from Different Motivators by Parity for Using a Programme Recommended Method among Han and Non-Han Ethnic Groups

	Han				Non-Han			
	Other	Woman	Couple	FP worker	Other	Woman	Couple	FP worker
Parity1	1.00 (reference)	0.40	1.92	0.55	1.40	0.57	2.69	0.78
Parity2	0.12	0.33	0.79	0.27	0.05	0.15	0.35	0.12

Source: derived from Table 4.

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