ABORTION AS A BACKUP METHOD FOR CONTRACEPTIVE FAILURE IN CHINA

DUOLAO WANG, HONG YAN and ZHONGHUI FENG

Journal of Biosocial Science / Volume 36 / Issue 03 / May 2004, pp 279 - 287
DOI: DOI:10.1017/S0021932003006217, Published online: 21 April 2004

J. biosoc. Sci. (first published online 2003) **36**, 279–287

DOI: 10.1017/S0021932003006217

ABORTION AS A BACKUP METHOD FOR CONTRACEPTIVE FAILURE IN CHINA

DUOLAO WANG*, HONG YAN† AND ZHONGHUI FENG†

**Medical Statistics Unit, Department of Epidemiology & Population Health, London School of Hygiene and Tropical Medicine, London and †Health Statistics Unit, School of Medicine, Xi'an Jiaotong University, Xi'an, Shaanxi, China*

Summary. Contraceptive failure rates for modern methods including sterilization are reported to be high in China, but little is known about the consequence of contraceptive failure and characteristics of women who decide to have an abortion if a contraceptive failure occurs. Using 6225 contraceptive failures from the 1988 Chinese Two-per-Thousand Fertility Survey, this study examines the resolution of contraceptive failure and assesses the impact of some women's sociodemographic characteristics on the decision to terminate contraceptive failure in abortion. This study has three important findings: (1) The abortion rate was 50·1%, 75·3% and 80·2% for IUD, condom and pill failures, respectively; (2) The abortion rates differed by contraceptive method and women's social and demographic characteristics. In particular, a woman with just one child was most likely to have the contraceptive failure aborted; (3) Some women experienced repeated abortions because of contraceptive failure. The results suggest that abortion was a backup method if contraception failed in China and the correlates of aborting an unwanted pregnancy reflect the strong impact of the Chinese family planning programme.

Introduction

Contraceptive failure rates for modern methods including sterilization are reported to be high in China (Kaufman, 1993; Wang, 2002). For example, the first-year failure rates were 4·2% for male sterilization, 0·7% for female sterilization, 10·3% for the intrauterine device (IUD), 14·5% for the pill, and 19·0% for the condom. There were also some differentials in contraceptive failure rates by users' sociodemographic and fertility characteristics. Contraceptive failure rate declined with women's age for all reversible methods. Rural women had higher sterilization, IUD and condom contraceptive failure rates than urban women did. High failure rates of contraceptive methods in China may have very important health implications (Wang & Altmann,

2002). Induced abortions, especially repeated and unsafe abortions, may be associated with serious adverse health, psychological, social and economic consequences.

Although there are some studies on contraceptive failure in China, little research has attempted to investigate the outcomes of contraceptive failure (Kaufman, 1993; Wang *et al.*, 1998; Wang, 2002; Wang & Altmann, 2002). An exception is the study by Wang *et al.* (1998), which examined contraceptive failure and its subsequent resolution in live births in the 1980s in China. The purpose of the present study is to examine the resolution of contraceptive failure in abortion by contraceptive method in the 1970s and 1980s and to assess the impact of socioeconomic and demographic variables, especially the family planning programme, on the decision to have an abortion if a contraceptive failure occurred. This study is unique in that it uses a large, nationally representative sample of 6225 contraceptive failures of four modern methods (sterilization, IUD, condom and pill) under real-life situations of contraceptive use and provides direct evidence of resolution of contraceptive failures in abortion in China.

Methods

The data for this analysis come from a 10% subsample of the National Survey of Fertility and Contraceptive Prevalence, often referred to as the 'Two-per-Thousand Fertility Survey', which was conducted by China's State Family Planning Commission from 1 July 1988 to 15 July 1988. The survey, representing a sample of two per 1000 persons in mainland China, targeted ever-married resident women aged 15–57 years. All provinces in the Chinese mainland took part in the survey. The high quality of these survey data and further details of them have been reported elsewhere (Li, 1991; Lavely, 1991; Wang *et al.*, 1998; Wang, 2002).

A total of 27 contraceptive methods were listed in the survey questionnaire, including modern and traditional methods. In this study, the focus was on modern methods only, which were advocated by the family planning programme, and classified into four types: (1) sterilization, including male and female sterilization. Male sterilization methods include surgical methods (vasectomy) and non-surgical methods (vas deferens blockade) and female sterilization methods (surgical and non-surgical methods); (2) IUDs; (3) pills, including three types of oral contraceptive methods commonly used in China; and (4) condoms.

The sample for the study is restricted to contraceptive failures that occurred between 1 January 1975 and 30 September 1987. Failures occurring after 30 September 1987 (about nine months before the survey interview) were excluded from the analysis because their exposure to the outcome may be censored. Inclusion of those failures may bias the results of subsequent outcomes of contraceptive failure. For example, more abortions than live births would be observed in this window. The sample thus consists of 6225 failures, contributed by 4993 women.

Contraceptive failure is here defined as unintended pregnancy occurring while a contraceptive is in use. This definition of failure includes both method failure and failures attributed to inconsistent or incorrect use, and is also called use failure (Trussell & Kost, 1987; Jejeebhoy, 1990). To assess the resolution of contraceptive failure, the abortion rate given contraceptive failure was calculated, i.e. the percentage

Table 1. Percentage distribution of outcomes of pregnancy given contraceptive failure, by method

Method	Live birth	Abortion	Still birth	Spontaneous abortion	All
Sterilization	63·2 (196)	32·9 (102)	0·6 (2)	3·2 (10)	310
IUD	47·2 (1947)	50·1 (2067)	0·7 (29)	2·1 (85)	4128
Pill	22·4 (249)	75·3 (839)	0·2 (2)	2·2 (24)	1114
Condom	17·1 (115)	80·2 (540)	0·1 (1)	2·5 (17)	673
Total	40·3 (2507)	57·0 (3548)	0·5 (34)	2·2 (136)	6225

Figures in parentheses are numbers of failures.

of contraceptive failure ending in an induced abortion against other outcomes of pregnancy (live birth, still birth or spontaneous abortion). Abortion rate given contraceptive failure was also calculated by method and for a number of selected women's sociodemographic characteristics.

To identify the determinants of abortion following contraceptive failure, a logistic regression model was employed. A logistic regression model examines the relationship between one or more risk factors and the log odds of having an abortion given a contraceptive failure. The logistic model was applied to IUD, condom and pill failures separately, except for sterilization failure, which has a small sample size. To control for the possible correlation among failures contributed by the same woman, a robust estimate of variance suggested by Huber (1967) was employed. A full model with all the risk factors included in this study was estimated so that the net effect of each risk factor (such as age at the time of contraceptive failure) could be assessed while other factors were controlled for. The results from logistic models are reported as odds ratios and their 95% confidence intervals. An odds ratio gives the change in the odds of an abortion for a category of a variable compared with the reference category for that variable and a 95% confidence interval gives the range in which the true odds ratio may lie.

Results

Table 1 displays the distribution of the outcomes of contraceptive failure by method. Overall, among the 6225 contraceptive failures, 2507 (40·3%) contraceptive failures ended in a live birth whereas 3548 (57·0%) resulted in an abortion. Still births and spontaneous abortions accounted for only about 2·7% of total outcomes.

The striking differences in resolving a contraceptive failure by contraceptive method are observed in Table 1. Only 32·9% of sterilization failures led to induced abortions whereas 50·1% of IUD, 75·3% of pill and 80·2% of condom failures resulted in abortions. This result suggests that there are different impacts of contraceptive failure for different methods. Contraceptive failure for sterilization and IUD may make some contributions to the level of fertility as sterilization is the most prevalent method, and IUD is the second most widely used method and also has a relatively

high failure rate (Wang & Altmann, 2002). Table 1 also shows over 60% of contraceptive failures for modern reversible methods ended in induced abortion, which may have some potential implications for women's health.

Further analysis of the resolution of contraceptive failure was done by computing the abortion rates given contraceptive failure by selected sociodemographic variables, and the corresponding results are presented in Table 2. The results of the logistic regression models by method are shown in Table 3.

It is obvious that the decision to terminate contraceptive failure in abortion was influenced by some women's social and demographic background and fertility history. The number of living children and prior history of abortion were the two most important factors predicting whether a contraceptive failure was followed by abortion. Over 40% of failures occurred in women who had one child and almost all these unintended pregnancies were aborted: abortion rate given contraceptive failure for these women was 95·7% compared with about 40% of women in other categories. The estimated odds of abortion for women with two or more children is only about 2–3%, 2–3% and 2–4% of that for women with no or just one child for IUD, condom and pill failures, respectively.

Women with a previous history of abortion would almost certainly have the unwanted pregnancy aborted for all methods. Most users of reversible methods (more than 75%) had a previous abortion and over 90% of them resorted to abortion. The odds of abortion for women with a previous abortion are 5667-, 450- and 110-fold those for women without a history of abortion for IUD, condom and pill failures, respectively.

Age seems to be an another important factor in determining the outcome following contraceptive failure for all methods, especially for reversible methods. The abortion rate increased with the age of the women.

In terms of period effect, it seems that women who started contraception during 1979–1982 had a slightly higher abortion rate than other periods after controlling for other variables. The differentials in abortion rates were also notable by urban–rural residence, education, occupation and ethnicity but were not statistically significant.

Discussion and conclusions

Using 6225 contraceptive failures from the 1988 Chinese Two-per-thousand Fertility Survey, this study has examined the levels and patterns of abortion following contraceptive failure, and assessed the impact of women's social, economic and demographic characteristics on the decision to have an abortion if a contraceptive failure occurred.

It has been reported that abortion has been a backup method when a contraceptive method fails in China (Delfs, 1990; Tien *et al.*, 1992), but lack of data on the resolution of contraceptive failure has failed to shed light on this issue. The results from this study show that abortion rate among contraceptive failures was 57·0% on average, much higher than the 21·1% abortion rate for all pregnancies between 1980 and 1989 calculated from the same survey data (Qu, 1991) and the 12·4% rate between 1985 and 1989 in north-west China (Feng, 1992). The high abortion rate after contraceptive failure provides strong evidence in support of the

Table 2. Abortion rate given contraceptive failure by method and women's characteristics (%)

Women's characteristics	All methods	Sterilization	IUD	Condom	Pill
Period					
1975–1978	45·5 (2247)	34·4 (61)	36·9 (1576)	65·7 (397)	74·6 (213)
1979–1982	61·0 (2617)	36·3 (179)	55·0 (1718)	79·6 (456)	84·8 (264)
1983–1987	68·2 (1361)	22·9 (70)	64·7 (834)	82·4 (261)	80·1 (196)
Residence					
Urban	81·6 (1965)	57·9 (19)	82·6 (884)	81·8 (494)	80·8 (568)
Rural	45·6 (4260)	31·3 (291)	41·2 (3244)	70·2 (620)	77·1 (105)
Age at failure					
≤24	44·9 (927)	10·0 (10)	42·0 (703)	54·9 (144)	58·6 (70)
25–29	55·0 (2785)	29·0 (100)	48·6 (1936)	74·9 (475)	75·9 (274)
30–34	62·7 (1703)	35·4 (130)	55·8 (1045)	81·1 (312)	86·1 (216)
35+	65·6 (810)	37·1 (70)	56·1 (444)	82·5 (183)	92·9 (113)
Number of living children					
0	43·6 (110)	na (0)	50·0 (16)	59·3 (27)	35·8 (67)
1	95·7 (2171)	na (1)	95·5 (1314)	96·1 (461)	95·9 (395)
2	40·9 (1881)	78·3 (46)	32·4 (1365)	61·9 (331)	61·9 (139)
3+	31·7 (2063)	24·7 (263)	25·3 (1433)	59·3 (295)	70·8 (72)
Education					
No school	34·7 (1974)	26·9 (175)	31·0 (1517)	58·5 (258)	66·7 (24)
Primary	54·3 (1800)	39·3 (107)	48·2 (1269)	76·1 (310)	77·2 (114)
Junior	75·2 (1559)	50·0 (22)	70·9 (904)	81·4 (365)	83·2 (268)
Senior+	79·9 (892)	na (6)	78·3 (438)	85·6 (181)	79·8 (267)
Occupation					
Agriculture	45·2 (4118)	30·8 (289)	40·9 (3147)	70·3 (589)	75·3 (93)
Industry	84·2 (836)	na (7)	87·6 (404)	84·1 (208)	78·3 (217)
Service	83·3 (401)	na (4)	84·6 (175)	82·6 (109)	83·2 (113)
Professional	84·3 (517)	na (2)	87·0 (193)	81·8 (110)	83·0 (212)
Other	60·6 (353)	na (8)	52·6 (209)	71·4 (98)	78·9 (38)
Ethnicity					
Minority	42·5 (421)	43·8 (16)	37·2 (274)	43·8 (89)	73·8 (42)
Han majority	58·0 (5804)	32·3 (294)	51·0 (3854)	78·0 (1025)	80·7 (631)
Previous abortion					
No	1·5 (2380)	0·0 (180)	0·1 (1864)	6·6 (226)	16·4 (110)
Yes	91·4 (3845)	78·5 (130)	91·2 (2264)	92·8 (888)	92·7 (563)

Figure in parentheses are number of failures.
na, not applicable due to small number of failures (< 10).

Table 3. Estimated effects of women's characteristics on abortion given contraceptive failure by method: odds ratios and 95% confidence intervals from logistic regression model[a]

Women's characteristics	IUD	Condom	Pill
Period			
1975–1978	1·00	1·00	1·00
1979–1982	1·31 (0·87,1·95)	2·83 (1·42,5·62)**	1·18 (0·51,2·71)
1983–1987	0·88 (0·55,1·40)	1·34 (0·69,2·57)	0·66 (0·26,1·70)
Residence			
Urban	1·37 (0·63,2·95)	1·42 (0·64,3·16)	3·07 (0·45,20·97)
Rural	1·00	1·00	1·00
Age at failure			
≤24	1·00	1·00	1·00
25–29	1·53 (0·82,2·83)	1·56 (0·59,4·16)	0·79 (0·21,3·04)
30–34	2·39 (1·25,4·57)**	2·85 (0·94,8·64)	2·66 (0·61,11·62)
35+	6·24 (2·90,13·41)***	7·93 (2·37,26·54)***	23·14 (3·88,137·86)***
Number of living children			
≤1	1·00	1·00	1·00
2	0·03 (0·02,0·07)***	0·03 (0·01,0·10)***	0·04 (0·01,0·11)***
3+	0·02 (0·01,0·04)***	0·02 (0·01,0·09)***	0·02 (0·00,0·08)***
Education			
No school	1·00	1·00	1·00
Primary	1·02 (0·69,1·50)	1·95 (0·96,3·97)	1·81 (0·38,8·56)
Junior	1·54 (0·90,2·63)	1·00 (0·49,2·04)	1·74 (0·30,10·15)
Senior+	0·91 (0·42,1·99)	3·62 (0·97,13·58)	1·74 (0·26,11·60)
Occupation			
Agriculture	1·00	1·00	1·00
Industry	1·62 (0·65,4·04)	1·84 (0·67,5·08)	2·04 (0·22,18·76)
Service	2·01 (0·54,7·44)	2·17 (0·63,7·49)	5·45 (0·63,46·92)
Professional	1·16 (0·36,3·73)	0·72 (0·19,2·70)	2·52 (0·29,22·03)
Other	0·99 (0·45,2·16)	1·11 (0·47,2·63)	1·85 (0·30,11·30)
Ethnicity			
Minority	1·00	1·00	1·00
Han majority	1·77 (0·97,3·23)	0·89 (0·34,2·32)	1·28 (0·27,6·08)
Previous abortion			
No	1·00	1·00	1·00
Yes	5667 (1497,21449)***	450·9 (177·1,1148·1)***	110·2 (42·5,286·0)***

[a]Significant two-tailed tests: *$p < 0·05$, **$p < 0·01$, ***$p < 0·001$.

argument that abortion was a remedial contraceptive method when contraception failed. Although there was a small amount of sterilization failure and some due to failure of reversible methods other than the IUD, by far the largest part of this

Table 4. Number of contraceptive failures by each woman

No. of contraceptive failures	No. of women	%
1	4006	80·2
2	807	16·2
3	137	2·7
4	30	0·6
5	9	0·2
6	2	0·0
8	1	0·0
9	1	0·0

abortion rate was the result of IUD failure and was caused by high use and a relatively high failure rate (Wang *et al.*, 1998; Wang & Altmann, 2002).

The differences in abortion rate given contraceptive failure by women's social and demographic background shown in this study suggest three main possible mechanisms through which women's characteristics included in the analysis may influence the resolution of contraceptive failure in abortion: some factors may reflect the effect of the family planning programme; other factors may illustrate low efficacy of contraceptive methods; and some may reflect women's motivation to limit their family sizes.

The first group of characteristics may indicate the effect of the family planning programme on the decision to have an abortion if a contraceptive failure occurs. The most obvious example is the high abortion rates given contraceptive failure. The high abortion rates reflect the implementation of the Chinese family planning programme, which advocates abortion when contraceptive method fails. Resolution of contraceptive failure in abortion by women with one child provides further evidence of the impact of the strong family planning programme. If a woman with one child had a contraceptive failure, she would almost definitely have an induced abortion. This result indicates a strong commitment to the one-child policy by some Chinese women. An alternative interpretation could be that the programme put pressure on these women to terminate their pregnancy.

The second group of factors may reflect the low effectiveness of modern contraceptive methods among certain women and in poor family planning services in some communities. The finding that abortion occurred repeatedly among some women who had a prior abortion may be related to improper use of contraceptives. To further investigate repeated abortion after contraceptive failure, Tables 4 and 5 were produced. Table 4 displays the distribution of the number of contraceptive failures contributed to the sample by each woman. About 20% of women contributed more than one contraceptive failure to the sample, and in particular one woman had nine contraceptive failures. Table 5 presents the distribution of the number of abortions following contraceptive failure contributed by each woman. Table 5 shows that although only 11·7% of women experienced more than one abortion, the abortions in these women accounted for about 38% of all abortions in the sample.

Table 5. Number of abortions following contraceptive failures experienced by each woman

No. of abortions following contraceptive failures	No. of women	%
0	2171	43·5
1	2239	44·8
2	476	9·5
3	82	1·6
4	17	0·3
5	5	0·1
6	3	0·1

These results suggest some evidence of a clustering of abortions: some women experienced repeated abortions after having repeated contraceptive failures. Some women would tend to retain risks associated with levels of personal knowledge about use of contraceptives and behaviour in resolving contraceptive failure. It may also be possible that some women generally would continue to be served by the same family planning personnel that provided poor service (such as inexperienced community doctors, limited supplies of different types and sizes of contraceptives to meet individual need, especially in rural areas) and when failure occurred they may exert pressure on women to have an abortion.

The third category of correlates of resolving a contraceptive failure may be related to women's motivation to limit their family sizes. Abortion rates increased with women's age, suggesting older women did not want any more children.

Three possible mechanisms through which the variables selected in this study may affect the decision to have an abortion when contraceptive failure occurred in China have been suggested. Other mechanisms may also be in operation given that many other factors, observable and unobservable, were not included in the analysis. This study used data from the 1988 survey, the only resource available for the study of outcomes of contraceptive failure under real-life situations at the national level. It is the belief of the authors that the results from this study are still of importance to the understanding of the sociodemographic determinants of resolution of contraceptive failure in China, as well as to the Chinese family planning programme, to improve its services. There is also potentially a wider relevance than just China: these findings are potentially relevant to the policy-making process in other developing countries with large populations. As China has experienced profound social and economic changes over the last three decades, future research is needed to assess the patterns and determinants of contraceptive failure and its subsequent outcome in China today.

Acknowledgments

Thanks are due to the Programme of Research Development and Training in Human Reproduction, World Health Organization and the Population Council in New York, which partially funded this work.

References

Delfs, R. (1990) Population growth threatens to get out of control: the fertility factor. *Far East Economic Review* **148**, 19.

Feng, Z. H. (1992) Abortion in Northwest China. In Feng, Z. H. (ed.) *Fertility Patterns and Infant Mortality*. Shaanxi Science and Technology Publishing House, Shaanxi, China, pp. 76–87.

Huber, P. J. (1967) The behavior of maximum likelihood estimates under non-standard conditions. In *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability*. University of California Press, Berkeley, CA, pp. 221–233.

Jejeebhoy, S. (1990) Measuring contraceptive use-failure and continuation: an overview of new approaches. In *Measuring the Dynamics of Contraceptive Use: Proceedings of the United Nations Expert Group Meeting.* United Nations, New York, pp. 21–45.

Kaufman, J. (1993) The cost of IUD failure in China. *Studies in Family Planning* **24**, 194–196.

Lavely, W. R. (1991) China unveils its monumental Two per Thousand Fertility Survey. *Asian Population Forum* **5**, 89–92.

Li, H. G. (1991) Introduction to National Survey of Fertility and Contraceptive Prevalence. In *Proceedings of National Seminar on National Survey of Fertility and Contraceptive Prevalence*. Hangzhou, China, pp. 2–9.

Qu, X. L. (1991) Patterns and differentials in the outcomes of pregnancies among Chinese women. In *Proceedings of National Seminar on National Survey of Fertility and Contraceptive Prevalence*. Hangzhou, China, pp. 57–69.

Tien, H. Y., Zhang, T., Ping, Y., Li, J. & Liang, Z. (1992) China's demographic dilemmas. *Population Bulletin* **47**(1).

Trussell, J. & Kost, K. (1987) Contraceptive failure in the United States: A critical review of the literature. *Studies in Family Planning* **18**, 237–283.

Wang, D. (2002) Contraceptive failure in China. *Contraception* **66**(3), 173–178.

Wang, D. & Altmann, D. (2002) Socio-demographic determinants of intrauterine device use and failure in China. *Human Reproduction* **17**(5), 1226–1232.

Wang, D., Diamond, I. & Curtis, S. (1998) Contraceptive failure and its subsequent effects in China: a two-stage event history model analysis. *Asia-Pacific Population Journal* **13**(1), 45–64.