Son Preference and Induced Abortion in Rural China: Findings from the 2001 National Family Planning and Reproductive Health Survey

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ABSTRACT

Using data from the 2001 National Family Planning and Reproductive Health Survey, this paper studies the relationship between son preference and induced abortion in rural China during periods with different birth control policies. The paper finds that temporal trends and patterns of variation in induced abortion and sex ratio at birth are fundamentally consistent. Among women with only two children, the risk of having an induced abortion to end the next pregnancy is significantly higher for those whose first child is a daughter than for those whose first child is a son. These results reveal that sex-selective abortion is widely prevalent, that son preference is an important determinant of induced abortion, and that sex-selective abortion has played an important role in the rise in sex ratio at birth in rural China.

Key words: son preference, induced abortion, sex-selective abortion, sex ratio at birth, birth control policy, rural China

INTRODUCTION

Dramatic socioeconomic changes and strict birth control policies have caused China's fertility to decline rapidly over the recent 20 years. The total fertility rate has declined from about 6 in the early 1970s to about 1.7 in 2000, far below replacement level (Liang, 2004; Retherford et al., 2004; Wang, 2004). In populations with strong son preference, a major drop in fertility is often followed by a rise in sex ratio at birth (hereafter written as SRB) (Zeng et al., 1993; Park and Cho, 1995; Das Gupta and Li, 1999). According to data from the last three population censuses, SRB in China increased from 108.5 in 1982 to 111.3 in 1990, and further to 119.9 in 2000, far exceeding the normal value of 105-107 (Liu, 2004a). Abnormally high SRB has been seen at the higher parities, especially when the prior births are daughters (Park and Cho, 1995; Gao, 1996; Poston et al., 1997; Zhang, 1998; Banister, 2004). Some researchers have claimed that son preference, embedded in the traditional Chinese culture, is the fundamental cause for the high SRB, and that sex-selective abortion is one important mechanism for a family to realize their preference for a son (Li, 1993; Zeng et al., 1993; Li et al., 1997; Pison, 2004). This is because sex-selective abortion is more common in families with only daughters, and the level of induced abortion increases with parity (Zeng et al., 1993; Park and Cho, 1995; Chu, 2001), suggesting that induced abortion is used not only to control family size but also to produce the desired sex configuration of children, especially in rural areas (Zeng et al, 1993; Park and Cho, 1995). Since modern technology, mainly the use of ultrasound B-scan for prenatal sex determination, became widely available in rural China during the mid 1980s (Hardee-Cleveland et al., 2000; Chu, 2001), sex-selective abortion has been regarded as one important factor causing the rise in SRB (Zeng et al., 1993; Gu and Roy, 1995; Tu and Smith, 1995; Chu, 2001; Qiao, 2004).

If sex-selective abortion is the primary method of realizing son preference, producing an increase in SRB, then temporal trends and patterns of variation in the frequency of induced abortion and SRB should be highly consistent. To date, however, most studies have focused on the relationship between son preference and SRB in China, and quantitative analyses of the impact of son preference on induced abortion in rural China are few (Gu and Roy, 1995; Park and Cho, 1995; Zhang, 1998; Murphy, 2003; Löfstedt et al., 2004). Sex-selective abortion of daughters reflects the low status of women generally. Further, it seriously affects women's reproductive health, and also results in a skewed SRB, hence a skewed future marriage market, which could result in a serious threat to the long-term stability and sustainable development of the Chinese society (Guo and Deng, 1995; Das Gupta and Li, 1999; Cai and Lavely, 2003; Banister, 2004). Therefore, more in-depth studies are needed to explore the relationship between son preference and induced abortion in rural China.

Using data from the 2001 National Family Planning and Reproductive Health Survey, this paper studies the relationship between son preference and induced abortion in rural China. The paper first compares the temporal trends and patterns of variation in SRB and induced abortion, and then analyzes the impact of son preference on induced abortion in rural China during different periods.

STUDY DESIGN

Analytic Framework

Induced abortion was legalized in China in 1957 but was not common before the 1970s (Mark, 1988; Rigdon, 1996). Hardee-Cleveland and Banister (1988) estimated the prevalence of induced abortion in China between 1971 and 1986, and found that the number of induced abortions was less than 5 million each year before 1979, after which it increased rapidly,

reaching a peak of more than 14 million in 1983, and declining to 8.9 million in 1984 and 11.6 million in 1986. The ratio of induced abortions to live births in China after 1970 has been estimated to have increased gradually from 0.15 in 1971 to 0.70 in 1983 and then decreased to 0.35 in 1999 (Qiao and Suchindran, 2001; Qiao, 2002). However, as a result of its huge population size, the annual number of induced abortions in China continues to be very high, around 10 million (Health Yearbook of China, 2004), and the proportion of induced abortions appears stable at about 27 among per hundred known pregnancies (Henshaw et al., 1999).

Many factors influence the prevalence of induced abortion. Studies on induced abortion in China have found that some individual and community factors affect the frequency of induced abortion. For instance, women at their peak reproductive age, women with more education, women living in urban areas, as well as women of the Han nationality are more likely to carry out induced abortion (Luo et al., 1995; Cheng et al., 1997; Zheng, 2000; Pang et al., 2004). Induced abortion is more likely to occur in areas with a relatively well-developed economy, a high level of urbanization and good hygienic conditions (Huang and Yu, 2000; Chen, 2002; Qiao, 2002; Löfstedt et al., 2004). However, in the context of China's unique political, social and cultural situations, the influence of the birth control policy and son preference on induced abortion cannot be ignored.

The prevalence of induced abortion is closely related to the onset of the birth control policy in China, and is therefore seriously affected by the birth control policies in place during different periods (Wolf, 1986; Wang et al., 2004). In the early 1970s, China launched a national family planning campaign promoting "later childbearing, more spacing, and fewer births". The strict one-child birth control policy was adopted in 1979, but since the mid 1980s women in rural areas have been allowed to have a second child under conditions specific to each province; these

mainly include those women whose first child is a daughter, whose second child is born at least four years after the first child, and who are at least 28 years old at the second birth (Attané, 2002). This is also called the "one son or two child" birth control policy in rural China. The government would prefer that the objective of the family planning should be met mainly by contraception rather than abortion, and the latter represents a last resort when the former fails (Rigdon, 1996). Nevertheless, abortion still has a significant influence on controlling population growth. The total estimated number of abortions in China was about 200 million in the 1970s and 1980s, equivalent to 80 million births averted (Zeng, 1991). To achieve their population control targets, some local governments have used abortion as an essential instrument of birth control. Violation of the birth control policy and failure of contraception became the main reasons for abortion, and the number of induced abortions has increased dramatically since the implementation of the birth control policy in 1979 (Rigdon, 1996; Wang et al., 2004). It has been demonstrated that the main reason for abortion in rural areas is pregnancy outside the birth control policy (Qiao, 2002). Among women whose first child is a daughter, or women whose current pregnancy has a longer interval than average from the previous birth, or women who are 28 years old and above, pregnancies are more likely to be within the governmental family planning program, and the risk of induced abortion is significantly lower (Tu and Smith, 1995). It follows that the stricter the birth control policy and its implementation in a district, the higher is the risk of induced abortion in that district (Huang and Yu, 2000). However, following the 1994 International Conference on Population and Development in Cairo and the 1995 Fourth World Conference on Women in Beijing, the Chinese government began to experiment with reproductive health and informed choice of contraceptive use in the national family planning program, and the focus shifted to empowerment of women and families and provision of more choices regarding contraceptive

technologies. Consequently, the number of induced abortions began to drop after the 1990s (Qiao, 2002).

On the other hand, son preference in traditional Chinese culture also has a strong influence on the prevalence of induced abortion (Arnold and Liu, 1986; Murphy, 2003). The norm of "rearing a son for old age" has been central for a long time in the rural areas, and probably constitutes the origin of son preference. Under the birth control policy, the reproductive objective of Chinese farmers has been transformed from "more children, more happiness" to "guaranteeing a son"; the result is strong son preference under limited fertility. When the desired number and sex of children cannot be achieved simultaneously, an ideal sex configuration of children can be realized at smaller psychological cost when prenatal sex determination is available (Gu and Roy, 1995; Croll, 2001). Sex-selective abortion, a form of parental discrimination against young daughters, is not only a result of enduring tradition or low fertility, but is probably exacerbated by the current strict birth control policy (Greenhalgh and Li, 1995; Johnson, 1996). However, prenatal sex selection has been practiced not only in Mainland China and Taiwan and Korea, where the Confucian culture remains strong, but also in other nations where political systems and population policies are significantly different. This suggests that the motivation for this discrimination against girls is indeed mostly cultural (Coale and Banister, 1994; Gu and Roy, 1995; Goodkind, 1996, 1999).

To date there have been few quantitative analyses of son preference and induced abortion, especially sex-selective abortion. Moreover, the published studies differ greatly in their conclusions about the roles played by the birth control policy and son preference on induced abortion. Tu and Smith (1995) used data from a sample survey conducted in December 1991 and January 1992 in four counties of Shandong and Hebei provinces in north China, and found that,

among women who have already had one child, the risk of induced abortion of the next pregnancy is jointly determined by women's age at pregnancy, the time since the first child, and the sex of the first child, and the risk of induced abortion is lower among women with only a daughter. Using data from the 1997 National Population and Reproductive Health Survey, it was also found that the risk of induced abortion of the next pregnancy is lower for women with a daughter than for those with a son (Qiao and Suchindran, 2001; Chen, 2002; Qiao, 2002). In addition, using data from the 2001 National Family Planning and Reproductive Health Survey, Liu (2004b) argued that the gender of previous child has a significant impact on the risk of inducing abortion of subsequent pregnancies, and this results mostly from the restrictive birth control policy, rather than sex selection behavior. All of these imply that the birth control policy and its implementation have an important influence on the prevalence of induced abortion. On the other hand, using a kinship network method, Chu (2001) conducted a small-scale survey that was specifically designed to study sex determination and sex-selective induced abortion among childbearing women in a dozen villages in central rural China, and claimed that a female fetus at higher parity, or with a sister, is more likely to be aborted, and women who have only daughters or whose current fetus is female are more likely to conduct sex-selective abortions. This suggests that son preference has an important effect on prevalence of induced abortion. However, the validity of Chu's results is limited by the small sample size and lack of representativeness of China. In short, previous studies differ in their indicators, data and methods, and so do their conclusions about the relationship between son preference and induced abortion. Therefore, more convincing studies are needed.

This paper proposes an analytic framework to study son preference and induced abortion in rural China, which is shown in Figure 1. Figure 1 shows that birth control policy factors,

community factors and individual factors interact not only directly to affect non sex-selective abortion, but also indirectly to affect sex-selective abortion through son preference. Furthermore, son preference results in sex-selective abortion and consequently leads to an increase in SRB. Son preference also results in other forms of discrimination against girls, such as female infanticide and underreporting of female births, which also increases the observed SRB, but is outside the scope of this paper.

Figure 1 here

Analytic Approaches

The birth control policy and son preference both have strong influences on induced abortion, and these effects interact. The joint influences of birth control policy and son preference on occurrence of induced abortion must be disaggregated to reveal the impact of son preference on occurrence of sex-selective abortion. In order to separate the effect of son preference from that of the birth control policy, a feasible and effective approach is to restrict the analysis to those women who are under similar birth control policies and regulations as much as possible, so that the influence of the birth control policy is minimized. However, in rural China, there are two levels of differences in birth control policy. The difference in the first level lies in the fact that women in different time periods and different geographic regions face different birth control policies. The difference in the second level lies in the fact that even among women who live in the same period and same region and who are under the same birth control policy, fertility restrictions on them may still vary with some individual factors, primarily the sex of the first child. Accordingly, we employ two analytic approaches, in which the corresponding target population is defined.

The first approach is to observe temporal trends of SRB and induced abortion, and to

compare the consistency of their patterns of variation across birth control policies, individual and community factors, as well as across parities and sex composition of previous children. If temporal trends and patterns of variation are parallel across these factors, it indirectly indicates the existence of the sex-selective abortion, as well as the influence of son preference on occurrence of induced abortion. This reasoning is based on the fact that existing studies have already shown the impact of son preference on high SRB (Gu and Roy, 1995; Park and Cho, 1995; Zhang, 1998; Murphy, 2003), if sex-selective abortion is an important way to realize son preference, temporal trends and patterns of variation in SRB and induced abortion should be highly consistent. Of course, induced abortion includes a substantial proportion of non sex-selective abortions. Therefore, a basic consistency between temporal trends and patterns of variation in SRB and induced abortion would indirectly indicate the influence of son preference on induced abortion. In addition, as only a live outcome of a pregnancy directly affects SRB, to better reflect any internal relationship between SRB and induced abortion, when calculating the proportion of induced abortion and comparing patterns of variation in induced abortion and SRB across parities and sex compositions of previous children, pregnancies corresponding to induced abortions include all the pregnancies before each live birth.

To reduce or exclude the influence of the first level difference in the birth control policy, this paper restricts the research targets to rural married Han nationality women. We do this because China's birth control policy differs between urban and rural areas, as well as between Han and minority women. In addition, since the mid 1980s, the majority of provinces in China have implemented a similar "one son or two child" birth control policy among Han women in rural areas. Only a few provinces have implemented either a universal "two child" policy or a universal "one child" policy (Peng, 1993). Among provinces implementing the "one son or two

child" birth control policy, women whose first child is a daughter are usually allowed to have a second birth if they are more than 28 years old and their second birth has a greater than four-year interval from the first child (Attané, 2002).

The second approach is to analyze directly the influence of son preference on induced abortion. In studies on the influence of son preference on SRB, a common indicator is the impact of parities and sex configuration of previous children on the sex of the next birth. If the previous children are girls and the SRB of the next birth is abnormally high, this usually indicates the direct influence of son preference on SRB (Coale and Banister, 1994). Consequently, it is expected that if the risk of ending next pregnancies by induced abortion is higher for women whose first child is a daughter than for those whose first child is a son, it can be inferred that sex-selective abortion exists; this shows directly the influence of son preference on occurrence of induced abortion. However, under the current "one son or two child" birth control policy in rural China, because of the second level difference in the birth control policy, the influence of the sex of the first child on abortion of subsequent pregnancies is mostly due to the birth control policy. Thus women whose first child is a son would be more likely to have induced abortion of their next pregnancies (Tu and Smith, 1995; Qiao and Suchindran, 2001; Chen, 2002; Qiao, 2002; Liu, 2004b). However, this effect is also partly due to son preference, making women who have strong son preference and whose first child is a daughter more likely to abort their next pregnancies (Chu, 2001). Obviously, birth control policy and son preference differ in the direction of their impact on induced abortion.

In order to make the impact of the sex of the first child on the abortion of next pregnancies depend more on that of son preference and less on that of birth control policy, as well as to reduce or exclude the impact of the second level difference in the birth control policy, this paper

further restricts the research targets to those Han rural women who have only two children. This is because the majority of these women are under the same "one son or two child" birth control policy, and for those women who have had two children with a son first, it can be inferred that most did not follow the birth control policy and had a birth outside of the government's family planning program. In some sense, the birth control policy has not actually succeeded in preventing the birth of the second child. Therefore, the birth control policy's restrictive effect on the number of children is actually about the same among women with two children. In addition, restricting the research population to women with two children has the advantage mentioned earlier that only a live outcome of a pregnancy can directly affect SRB. This ensures the consistency of our analyses of induced abortion and SRB.

Since birth control policy has varied greatly during recent Chinese history, this paper also adopts a period-specific analytic strategy. 1965 to 1979 represents the period of no policy or a relaxed "later childbearing, more spacing, and fewer births" policy, with fertility declining rapidly; 1980 to 1989 represents the period of relatively strict birth control policy, with fertility fluctuating around the replacement level; 1990 to 2001 represents the period of stable birth control policy, with fertility gradually declining to below replacement level.

DATA AND METHODS

Data

Data used in this paper come from the 2001 National Family Planning and Reproductive Health Survey, organized and conducted by the National Family Planning Commission (NFPC, 2001). The survey targets included childbearing women aged from 15 to 49 years old from all over China. The survey was divided into three stages, and the whole country was divided into 31 strata, with each stratum representing one province. Also, each province was regarded as one

subpopulation and a three-stage sampling strategy was implemented. In the first stage, counties, urban districts and cities were selected using a "probability proportional to size" sampling method. In the second stage, within each selected county, urban district and city, three to four townships, towns, and urban streets were selected again using a "probability proportional to size" sampling method. In the third stage, within each selected township, town, and urban street, one village or urban neighborhood committee was selected. A total of 1,041 villages and urban neighborhood committees were sampled in the whole country, with 830 villages and 211 urban neighborhood committees. There were 39,586 women of childbearing age in the survey, including 10,074 urban women and 29,512 rural women. The third stage was carried out in August and September in 2001.

Data used in this paper are from the two questionnaires in the third stage of the survey, including information about a community's economic and infrastructure facilities from the community questionnaire, as well as information about women's pregnancy and birth history from the household questionnaire. The survey sites and survey contents of the 2001 survey are basically the same as those of the 1997 National Population and Reproductive Health Survey organized and conducted in 1997 by the National Family Planning Commission (NFPC, 2001). However, because there were some changes in the content of the questionnaires between the two surveys, especially in the community questionnaire and household questionnaire from which key information used in this paper was derived, here we do not use data from the 1997 survey to conduct a longitudinal study.

There were 22,422 rural married women of childbearing age of Han nationality in the sample analyzed here. Among them, 21,954 women had a pregnancy history, with a total of 50,482 pregnancies; 5,085 women had an abortion history, with a total of 7,033 induced

abortions; and 21,522 women had a birth history, with a total of 41,477 births. Among all of these pregnancies, those that occurred after 1980 account for 87.4 percent, and those where the women's age at pregnancy was below 27 years old account for 80.2 percent. Among all these women, those with junior high school education and below account for 94.9 percent. At the time of the survey, the median per capita income in the sampled villages was 1,979 yuan, and 80.5 and 94.3 percent of villages had a primary school and rural doctors, respectively. The average distance from village to township was 4.4 kilometers, and the sampled women were more or less evenly distributed across eastern, central and western regions of the country.

The focus of this study is on rural married Han nationality women with only two children at time of survey, a total of 9,306 women. Our analysis focuses on these women's 11,373 pregnancies and 1,676 live births after the first birth, accounting respectively for 22.5 and 23.8 percent of those for all rural Han nationality women. Among these women, the first child of 56 percent was a daughter, 75 percent of them became pregnant at age younger than 28, and 95 percent of them had an education of junior high school or below. 78 percent of the pregnancies were after 1980, and 60 percent of them had an interval from the first child that was less than 3 years.

The basic unit of analysis in this paper is each pregnancy and abortion, and the accuracy of data for induced abortion is therefore very crucial. Underreporting and misreporting of pregnancies ended by abortion are quite common in a retrospective survey, and they are usually more severe for years more remote from the survey time (Tu and Smith, 1995; Qiao, 2002). Data from the 2001 survey have been compared with those from the 1997 survey and the national official statistics, and it was found that induced abortion was underreported in the 2001 survey (Liu, 2004b; Pang et al, 2004). However, the aims of this paper are not to estimate the number of

induced abortions and SRB, but to examine the temporal trends and patterns of variation in induced abortion and SRB, and to assess the impact of son preference on sex-selective abortion. Therefore, underreporting of induced abortion in the 2001 survey is unlikely to affect greatly the results of this study.

Methods

Our analysis is divided into two parts. The first part is to compare the consistence of the temporal trends and patterns of variation in induced abortion and SRB by using data of pregnancy, birth and abortion history of all rural married Han nationality women. First, the paper compares the consistency of the temporal trends and patterns of variation in SRB and induced abortion across birth control policy, individual and community factors, including 50,482 pregnancies, 7,033 induced abortions, and 41,477 live births to 21,954 married Han nationality rural women. We then examine patterns of variation in SRB and induced abortion by parity and sex composition of previous children, and further compare their consistency, including 41,477 live births ever born to 21,522 women for analysis of SRB, and 45,741 pregnancies and 2,706 induced abortions corresponding to all live births for analysis of induced.

The second part employs logistic regression models to assess the impact of son preference on occurrence of induced abortion by using data of pregnancy, birth and abortion history of women with only two children, after controlling for birth control policy, as well as individual and community factors. The dependent variable is whether a woman carries out an induced abortion for each pregnancy after the first child. The independent variable in the models is the sex of the first child. This includes all of these women's pregnancies and induced abortions after the first child, including 11,373 pregnancies and 1,676 induced abortions.

Both parts include birth control policy, individual and community factors. In the context of

China's rural birth control policy and its implementation, as well as the characteristics of survey data, this paper defines these three category factors as follows.

Birth control policy factors include women's year of pregnancy, age at pregnancy, and interval from the first birth to the current pregnancy, so as to further control for the second level difference in the birth control policy. These three variables attempt to represent restrictions due to the birth control policy on women's childbearing in terms of number, age and interval, respectively. Corresponding to different birth control polices in different periods, year of pregnancy is divided into three periods 1965-1979, 1980-1989 and 1990-2001. Regulations regarding age at second birth and interval between first and second births differ somewhat across different provinces, but in general they are 28 years old and at least 3 to 4 years respectively (Pan, 2001). Following Tu and Smith (1995), the paper divides woman's age at pregnancy into two categories, 27 and below, and 28 and above, and birth interval into three categories, namely less than 0-2 years, 3 years, and 4 or more years.

Individual factors include women's education, which is divided into four categories, illiterate, primary school, junior high school and senior high school and above.

In previous studies, community factors determining occurrence of induced abortion have usually included two variables, namely per capita income and location of village (Chen, 2002; Qiao, 2002). However, infrastructure and degree of modernization of community may also affect the occurrence of induced abortion. Following suggestions by Zhang (2000), this study includes the following community variables: per capita income, whether there is a primary school, whether there are rural doctors, distance from township and location of village. Per capita income is divided into four categories: less than 1000 yuan, 1000 to 1999 yuan, 2000 to 2999 yuan, and 3000 yuan and above. Distance from township is divided into two categories: less than

5 kilometers and 5 kilometers and above. Location of village is divided into three categories: eastern China, central China, and western China.

RESULTS

Trends and patterns of variation in induced abortion and SRB

Table 1 shows the proportion of induced abortions and SRB of all Han nationality rural women by birth control policy, as well as individual and community factors. The results indicate that the temporal trends of induced abortion and SRB are highly consistent. Between 1965 and 2001, while the proportion of induced abortion increased from a very low level before 1979 (5.1 percent) to a relatively high level in 1995-2001 (19.5 percent), SRB increased rapidly from a basically normal level before 1979 (105.5) to a very abnormal level in 1995-2001 (129.6).

Table 1 here

Table 1 also shows that patterns of variation in level of induced abortion and SRB are highly consistent across most variables. Women who are older at pregnancy, those with higher education, as well as those living in villages with higher per capita income, or without a primary school, or shorter distance from township, have a higher proportion of induced abortion and higher SRB. However, patterns of variation in proportion of induced abortions and SRB are not consistent in three variables. The longer the interval of the current pregnancy from the previous birth, the lower is the risk of induced abortion, but the higher is the SRB. Women in villages with doctors have a higher risk of induced abortion, but a lower SRB. While the proportion of induced abortions distributes along a “U” shape across eastern, central and western areas, the corresponding SRB shows the reversed “U” shape distribution. It is noted that SRB is above the normal level across all categories of variables, indicating the universal existence of son preference in rural China.

Table 2 presents SRB of Han rural married women by year of birth, as well as by parity and sex composition of previous children. SRB is closely related to year of birth, parity and sex composition of previous children. First, in terms of year of birth, SRB was normal before 1979 among children of parities 1, 2 and 3. However, since the implementation of the birth control policy in the 1980s, SRB at parities 2 and 3 has increased greatly. Second, SRB at parity 1 has always been normal across all periods but increases with parity. Third, SRB is relatively abnormal among births whose previous siblings were all sisters. Finally, SRB of last-born children far exceeds the normal level across all periods. In general, SRB is higher and more abnormal among recent births, and among births at higher parities, among births whose previous siblings were girls. These are basically consistent with previous findings (Poston et al., 1997; Zhang, 1998; Qiao, 2002; Banister, 2004).

Table 2 here

Table 3 records the proportion of pregnancies aborted by year of pregnancy, as well as by parity and sex composition of previous children. The proportion of induced abortion here refers to the proportion of all aborted pregnancies out of all known pregnancies before each live birth. In Table 3, note first that the proportion of induced abortion has been greatly increasing along with the implementation of the birth control policy. Second, parity and sex composition of previous children greatly affects the risk of induced abortion of the next pregnancy. Rural women rarely carry out an induced abortion before they have their first child; but the proportion of induced abortion between the first and second child is very high, and that for women with first child a daughter is the highest. Especially under the implementation of the current birth policy from 1980 to 2001, the proportion of pregnancies aborted by women whose first child is a daughter is remarkably higher than that of women whose first child is a son. The proportion of

pregnancies aborted at second-to-last parity is higher in all periods. In general, the risk of induced abortion is higher among women with higher parity pregnancies, pregnancies with previous female children, and recent pregnancies, suggesting the universal existence of sex-selective abortion, in essential agreement with earlier studies (Zeng et al., 1993; Chu, 2001). Comparing the results in Tables 2 and 3, we see that the temporal trends and patterns of variation in SRB and proportion of induced abortion are quite consistent across year of pregnancy/birth, parity and sex composition of previous children.

Table 3 here

Determinants of induced abortion

Table 4 reports the estimated odds ratios of inducing abortion of pregnancies after the first birth for all Han nationality rural women with only two children. There are four models in the logistic regressions. Model 1 estimates the odds ratios of induced abortion for all women, and models 2 to 4 estimate the ratios for pregnancies occurring in the three different birth control policy periods, respectively. The results of these four models are summarized as follows.

Table 4 here

First, the sex of the first child has a significant impact on the risk of induced abortion. In general, the risk of induced abortion for women whose first child is a daughter is significantly higher than for those whose first child is a son, with the odds ratio of the former about 40.2% higher than that of the latter. However, this gender effect differs among the three periods. While the gender effect is not significant in 1965-1979, it is significant and has greatly increased in the two periods of the 1980s and 1990s, with the effect increasing from 26.3% to 58.4%.

Second, women's year of pregnancy, age at pregnancy, and interval of current pregnancy from the first child also have a significant impact on the risk of induced abortion. The influence

of year of pregnancy is strong, with the risk of induced abortion for women who were pregnant in the 1980s and 1990s being higher than that for those who were pregnant before 1979. The risk of aborting their pregnancy for women 28 years old or above is significant lower than that for those below 28, but the effect is significant only among pregnancies in the 1990s. The longer the interval from the first birth, the lower is the risk of aborting a pregnancy, and this effect is significant and similar in all the three periods studied. These suggest that pregnancies within the governmental family planning program are less likely to be aborted (see also Tu and Smith (1995)).

Third, woman's education has a significant influence on occurrence of induced abortion; women with more education have a higher risk of induced abortion. However, this effect is significant only in the 1980s and 1990s, and it is about the same in the two periods.

Finally, community factors have a significant influence on women's risk of induced abortion. The higher the per capita income of the village, the higher is the risk of aborting a pregnancy. This income effect occurs mainly in the 1980s and 1990s. The risk of induced abortion for women in villages without a primary school is higher in all three periods. The risk of induced abortion for women in villages with rural doctors is higher, and the effect is much stronger in the 1980s. The influence of distance from township to the village on induced abortion is not significant. In general, the risk of induced abortion for women in central China is relatively lower, but differs in the three periods. The regional effect is not significant for 1965 to 1979. In the 1980s, the risk of induced abortion is highest among women in western China, medium in eastern China, and lowest in central China. However, in the 1990s, while the risk is lowest among women in the central China, it is about the same in western and eastern China.

In general, the sex of the first child, birth control policy factors, as well as women's

individual and community factors all have a significant impact on women's risk of induced abortion of pregnancies after the first birth, and these effects differ among the three periods.

DISCUSSION AND SUMMARY

Using data from the 2001 National Family Planning and Reproductive Health Survey, this paper explores the relationship between son preference and induced abortion among married Han nationality women in rural China, with a focus on those women with only two children. In the context of the differences in the birth control policies within the three periods, this paper has examined the consistency of the temporal trends and patterns of variation in SRB and induced abortion, and analyzed the influence of sex of the first child on risk of induced abortion of the next pregnancies. There are several observations and findings from the analyses of this study of the relationship between son preference and induced abortion.

First, the paper demonstrates the universal existence of son preference in rural China; son preference has intensified recently, and discrimination against girls has been shown to be highly selective. SRB has deviated from normal across all kinds of individual and community factors, demonstrating the universal existence of son preference. Since the implementation of the current birth control policy, SRB has increased dramatically, especially among births of high parity and births with all preceding siblings female. All of these indicate intensification of son preference (Zeng et al., 1993; Park and Cho, 1995; Poston et al., 1997; Banister, 2004). The abnormally high SRB among last-born children across all the three time periods further demonstrates the existence of son preference and sex-selective abortion (Park, 1994).

Second, the paper reveals that son preference has an important influence on induced abortion, which corroborates the universal existence of sex-selective abortion. That the risk of induced abortion is significantly higher among women whose first child is a daughter than for

those whose first child is a son indicates the existence of sex-selective abortion and the influence of son preference on induced abortion. The consistency of the temporal trends and patterns of variation in SRB and induced abortion further reveals that sex-selective abortion is the main method of realizing son preference and leads to the rise in SRB (Zeng et al., 1993; Gu and Roy, 1995).

Third, this paper shows that the birth control policy has intensified the existing son preference and increased women's risk of induced abortion. Since the implementation of the current birth control policy, SRB has been rising with parity, and among women with two children, the risk of induced abortion for women whose first child is a daughter has been significantly higher than that for those whose first child is a son, indicating that the birth control policy has intensified the son preference embedded in the traditional Chinese childbearing culture (Gu and Roy, 1995; Croll, 2001). If son preference were weak, the rapid fertility decline would not necessarily lead to an abnormally high SRB (Poston et al., 1997). The restrictive birth control policy of China has made the era of low fertility occur much earlier and reduced opportunities for childbearing, indirectly causing this policy effect. That the proportion of induced abortion has increased since the implementation of the current birth control policy, that the risk of induced abortion is significantly higher among pregnancies after 1980, that pregnancies within the governmental family planning program are less likely to be aborted, all suggest that the birth control policy has increased the risk of induced abortion, which is consistent with findings of other studies (Tu and Smith, 1995; Rigdon, 1996; Qiao, 2002; Wang et al., 2004).

Finally, some individual and community factors that have been found to influence induced abortion in existing studies are also confirmed in this paper. Women with higher education,

living in villages with higher per capita income, or with rural doctors are more likely to use diversified contraceptive measures and consequently to face more contraceptive failure. In addition, these women have more knowledge of contraception, pregnancy and abortion and are more willing to use induced abortion to terminate unwanted pregnancies. The risk of induced abortion is therefore higher among these women (Huang and Yu, 2000; Chen, 2002; Löfstedt et al., 2004). The difference in proportion of induced abortion among women in the eastern, central and western regions indicates that the regional effect on induced abortion needs to be considered in an integrated framework including economic, social and cultural factors as well as implementation of the birth control policy.

China is a country with strong cultural preference for more children, and "rearing a son for old age" is deeply rooted in the traditional son preference culture. The implementation of the current birth control policy and the socioeconomic transformation have resulted in a relatively low fertility and have intensified son preference. As a result, sex-selective abortion becomes a method for some women and their families to solve the problem of fulfilling their desire for a son without violating the birth control policy. Indeed, it is sex-selective abortion based on strong son preference that leads to the recent rapid rise in SRB.

It is worth noting that some scholars, using data from the 1997 or 2001 survey, found that the risk of induced abortion is lower for women whose first child is a daughter than for those whose first child is a son (Qiao and Suchindran, 2001; Chen, 2002; Qiao, 2002; Liu, 2004b). This is contrary to our findings here that son preference significantly affects occurrence of induced abortion. As mentioned earlier, the major causes underlying this difference in conclusions are related to the different analytic approaches and analytic targets adopted in the studies. The previous studies used all women with birth history, including urban and rural

women, Han nationality and minority nationality women. Therefore, the differences in the birth control policy between urban and rural, as well as among different minority populations are not fully accounted for. In addition, these earlier studies did not take into account that the sex of the first child affects how both the birth control policy and son preference influence a woman's decision to induce abortion of her next pregnancy after her first child, and the direction of the effects of son preference and birth control policy is opposite. Because the effects of son preference and birth control policy on induced abortion were not separated, these studies address more the effects of birth control policy on induced abortion, rather than those of son preference. By contrast, our approach here attempts to reduce or exclude the impact of birth control policy and to isolate the effect of son preference as much as possible; thus the targets of the analysis are restricted to women with the same birth control policy. Consequently, the analysis focuses on Han rural married women with two children. This enables us to better isolate the influence of son preference on induced abortion.

Our findings have some limitations. First, there is a lack of detailed information on induced abortion in the original household questionnaire, which limits the depth of our study. If the questionnaire had contained more relevant information for each pregnancy, such as timing of the beginning of pregnancy, whether ultrasound B was used, and reasons for each induced abortion, it would help to determine directly the existence of sex-selective induced abortion and analyze determinants of induced abortion. Second, the regression analysis of this paper is designed to target women with only two children in their lifetime. However, women with two children at the time of the survey are selected and used in our regression analyses. Because some women may not have finished childbearing at the time of survey, both data censoring and data selection bias may occur, which inevitably affect the validity of the research results. If there were more

information available about the timing of pregnancies and induced abortions, event history analysis could provide more accurate results.

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Table 1 Proportion of induced abortion and SRB (to be continued)

	Proportion of induced abortion			SRB			
Factor	Number of pregnancies	Number of induced abortions	Proportion (%)	Number of live births	Male	Female	SRB
Birth control policy factors							
Year of pregnancy							
1965–1969*	27	0	0	27	19	8	237.5
1970–1974	1289	22	1.7	1208	629	579	108.6
1975–1979	5069	305	6.0	4554	2323	2231	104.1
1980–1984	9651	1177	12.2	8124	4293	3831	112.1
1985–1989	13342	1618	12.1	11307	5921	5386	109.9
1990–1994	11102	1959	17.6	8729	4842	3887	124.6
1995–1999	7804	1564	20.0	5851	3283	2568	127.8
2000–2001	2198	388	17.7	1677	966	711	135.9
Age at pregnancy							
27^{-}	40466	4922	12.1	33947	18004	15943	112.9
28^{+}	10016	2111	21.1	7530	4272	3258	131.1
Pregnancy interval (Years)**							
0–2	14332	3835	26.8	9967	5519	4448	124.1
3	4926	902	18.3	3884	2203	1681	131.1
4^{+}	8088	1710	21.1	6104	3528	2576	137.0
Individual factors							
Education							
Illiterate	14103	1379	9.8	12211	6570	5641	116.5
Primary	19440	2752	14.2	15919	8560	7359	116.3
Junior high	14579	2476	17.1	11511	6136	5375	114.2
Senior high^{+}	2360	426	18.3	1836	1010	826	122.3

Table 1 Proportion of induced abortion and SRB (continued)

Factor	Proportion of induced abortion			SRB			
	Number of pregnancies	Number of induced abortions	Proportion (%)	Number of live births	Male	Female	SRB
Community factors							
Per capita income (Yuan)							
0–999	7872	706	9.0	6860	3670	3190	115.0
1000–1999	18779	2279	12.1	15749	8488	7261	116.9
2000–2999	13785	1934	14.0	11335	6078	5257	115.6
3000^{+}	10046	2114	21.0	7533	4040	3493	115.7
Having rural doctor							
No	9388	2052	21.9	6997	3803	3194	119.1
Yes	41094	4981	12.1	34480	18473	16007	115.4
Having rural doctor							
No	3016	369	12.2	2540	1408	1132	124.4
Yes	47466	6664	14.0	38937	20868	18069	115.5
Distance from township (km)							
≤5	38515	5562	14.4	31447	16931	14516	116.6
>5	11967	1471	12.3	10030	5345	4685	114.1
Region							
Eastern	19513	3209	16.4	15635	8381	7254	115.6
Central	18466	1828	9.9	15818	8538	7280	117.3
Western	12503	1996	16.0	10024	5357	4667	114.8
Total	50482	7033	13.9	41477	22276	19201	116.0

Source: 2001 National Family Planning and Reproductive Health Survey.

* 1965 is the earliest year in the survey in which pregnancies were terminated by women. Because of the very small number of cases in 1965–1969, SRB and proportion of induced abortion are only for reference.

** Pregnancy interval stands for interval of the current pregnancy from the previous child. No interval is calculated when there is no previous child, which brings a total of 27,346 pregnancies and 19,955 live births.

Table 2 SRB by parity and sex composition of previous children and year of birth

Birth year	p1	p2	m2	f2	p3	mm3	mf3	fm3	ff3	p-n	Total
1965–1979	104.9	107.4	113.8	101.4	108.1	75.4*	118.8*	94.8	140.0	175.7	105.5
Cases	3421	1755	881	874	512	114	105	113	180	1180	5796
1980–1989	105.1	111.8	99.8	124.4	121.1	87.8	113.2	96.9	171.9	184.8	110.8
Cases	9228	6779	3277	3502	2622	524	548	571	979	8159	19529
1990–2001	105.1	155.7	110.9	195.4	171.9	72.3	123.7	161.2	298.2	165.7	126.9
Cases	8873	5396	2088	3308	1490	255	255	303	677	12183	16379
Total	105.0	126.3	105.3	146.7	133.5	81.5	116.7	112.7	203.5	173.2	116.0
Cases	21522	13930	6246	7684	4624	893	908	987	1836	21522	41477

Source: 2001 National Family Planning and Reproductive Health Survey.

Note: p1, parity 1; p2, parity 2; p3, parity 3; p-n, last parity;
m2, parity 2 with 1st birth male; f2, parity 2 with 1st birth female;
mm3, parity 3 with first two births male; mf3, parity 3 with first birth male and second birth female;
fm3, parity 3 with first birth female and second birth male; ff3, parity 3 with first two births female.

* Denotes cases where the numerator and/or denominator are less than 50.

Table 3 Proportion of induced abortion by parity and sex composition of previous children and year of pregnancy (%)

Year of pregnancy	p0 →p1	p1 →p2	m	f	p2 →p3	mm	mf	fm	ff	p-n-1 →p−n	Total
1965–1979	0.9	7.5	7.5	7.5	6.5	7.4	6.9	3.7	7.4	9.3	3.6
Cases	3665	3609	1779	1830	1235	285	261	268	421	3817	6274
1980–1989	1.4	11.8	10.8	12.7	5.5	6.7	4.7	6.6	4.8	9.8	6.1
Cases	9766	8859	4038	4821	3014	549	601	636	1228	13746	21395
1990–2001	3.6	14.0	12.7	14.7	4.1	2.9	1.7	5.2	4.7	8.2	6.5
Cases	9518	3773	1348	2425	788	136	116	173	363	11279	10872
Total	2.2	11.4	10.3	12.2	5.5	6.4	0.9	5.7	5.3	9.1	5.9
Cases	22949	16241	7165	9076	5037	970	978	1077	2012	28842	45741

Source: 2001 National Family Planning and Reproductive Health Survey.

Note: p0, parity 0; p1, parity 1; p2, parity 2; p3, parity 3; p-n, last parity; p-n-1, second to the last parity;
m, 1 male child; f, 1 female child;
mm, 2 male children; ff, 2 female children;
mf, two children with first male and second female; fm, two children with first female and second male.

Table 4 Odds ratio of conducting induced abortion after first birth for women with only two children

Variable	1965–2001 (model 1)	1965–1979 (model 2)	1980–1989 (model 3)	1990–2001 (model 4)
Independent variable				
Sex of first child (Male)				
Female	1.402***	1.411	1.263**	1.584***
Control variable				
Birth control policy factors				
Year of pregnancy (1965–1979)				
1980–1989	1.504***			
1990–2001	1.442**			
Age at pregnancy (27^{-})				
28^{+}	0.676***	5.021	0.864	0.491***
Pregnancy interval (0–2)				
3	0.620***	0.324***	0.545***	0.773*
4^{+}	0.334***	0.061***	0.335***	0.384***
Individual factors				
Education (Illiterate)				
Primary	1.444***	1.382	1.607***	1.281*
Junior high	1.495***	1.879	1.703***	1.385*
Senior high^{+}	1.814***	3.953	1.986***	1.599*
Community factors				
Per capita income (0–999)				
1000–1999	1.371**	1.210	1.359*	1.316*
2000–2999	1.426***	0.975	1.501**	1.413*
3000^{+}	1.863***	1.647	2.166***	1.469*
Having elementary school (No)				
Yes	0.531***	0.508**	0.455***	0.658***
Having rural doctor (No)				
Yes	1.668***	1.643	2.106***	1.357+
Distance from township (≤5)				
>5	1.078	0.793	1.048	1.188
Region (Eastern)				
Central	0.696***	0.672	0.594***	0.748**
Western	1.116	1.261	1.470**	0.786+
Constant	0.094***	0.153**	0.111***	0.154***
–2LL	8817***	545***	4087***	4094***
Cases	11373	769	5011	5593

Source: 2001 National Family Planning and Reproductive Health Survey.
*** P < 0.001, ** P <0.01, * P < 0.05, + P < 0.10.
Variables in brackets are reference variables.

Figure 1 Analytic framework of son preference and induced abortion in rural China