SEX-SELECTIVE ABORTIONS:
EVIDENCE FROM RURAL EAST CHINA[1]

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ABSTRACT

This article addresses the issue of sex-selective abortion underlying the rising and abnormally high sex ratio at birth in China. The data are derived from a survey of 1602 married women aged 20-45 and from interviews with cadres involved in family planning work in rural East China in 2002. Prenatal sex identification and sex-selective abortion were fairly widespread among the pregnancies after first birth. The aborted foetuses were overwhelmingly females and virtually all the sex-selective abortions were second- or even third-trimester procedures. Cultural context of son preference associated with this practice is discussed. The basic issue underlying son preference is the male-based continuation of the family. Patricentricity, patrilineality and patrilocality are basic elements of the Confucian patriarchal society. The evidence from this study suggests that son preference will continue as long as the cultural context for son preference continues, and legislation outlawing prenatal sex identification can hardly make a difference.

[1] This paper is derived from a chapter of my PhD thesis which I did during January 2001 to December 2003 at Demography and Sociology Program of the Australian National University. I am grateful to Professor Terry Hull, Dr. Siew-Ean Khoo, and Dr. Zhao Zhongwei for their comments and suggestions; the related County and Township Family Planning Commission in China for their assistance in the survey, particularly the interviewers and respondents for their time and work involved in the survey; and the Demography and Sociology Program at the Australian National University for a fieldwork grant. The views expressed in this paper are those of the author and not of the institution where the work was done, nor that of the various levels of the government in China assisted in the survey. Direct correspondence to Chen Wei, Center for Population and Development Studies, People's University of China, Beijing 100872, China. Email: weichen@ruc.edu.cn

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INTRODUCTION

China's 2000 census (NBSC 2001) reports that sex ratio at birth (SRB) in China has continued rising over the last decade despite the government's considerable efforts in banning sex-selective abortion as well as "digging out" the under-reported births. For China as a whole, SRB rose from 111.3 in 1990 to 116.9 in 2000. In 1990, no province had a SRB over 120, however, in 2000, there were 7 provinces with SRB higher than 120. In 1990, there were 7 provinces with SRB standing at normal, however, only two provinces in 2000 had normal SRB.

While scholarly debate in China over the possible explanations to the abnormally high SRB in China tends to attribute it largely to under-reporting of female births (e.g. Zeng et al. 1993; Gao 1993; Tu 1993; Gu and Xu 1998), the State Family Planning Comission's effort in cleaning up the under-reported births has surprisingly found more male than female births were under-reported during 1990-1999 in virtually all the provinces (SFPC 2000).[2] This unfortunately implies that the reported very high SRB may even be an underestimate of the true SRB, thus the situation is worse than what we have seen.

Scholars both in China and abroad attach less importance to sex-selective abortion to be responsible for the rising SRB. Aird (1990), Hull (1990) and Coale and Banister (1994) argue or speculate that the major cause of the high SRB in China is excessive mortality of female children resulting from female infanticide or neglect and ill-treatment, while Johansson and Nygren (1991) and Park and Cho (1995) do not believe that modern technologies for prenatal sex identification are widely available in China. These arguments, however, fail to account for two facts in China: On the one hand, China's family planning and health care system were fairly well equipped with modern technologies including ultrasound in the 1980s; On the other hand, they were not aware of the traditional Chinese methods for prenatal sex identification practiced fairly widely in rural areas.

If female infanticide is negligible (Zeng et al. 1993; Chu 2001) while birth under-reporting is in fact biased towards male infants, then sex-selective abortions must be mainly responsible for the rising and abnormal SRB in China. However, no evidence at the provincial or national level is available to support this argument. The gap of the knowledge results from the gap of data collection on this issue. This study attempts, to some extent, to fill in the gap through a survey obtaining direct quantitative evidence on prenatal sex identification and sex-selective abortion in East China. Results are presented on fertility desires and son preference, knowledge and practice of prenatal sex identification, and patterns and determinants of sex-selective abortions in the study area.

[2] The State Family Planning Commission of China conducted in 1999 a cleaning up of birth under-reporting in the 1990s. Its major purpose is to address the issue of too low fertility in China that is believed to be partly caused by birth under-reporting. However, under-reported births are found to have a higher sex ratio at birth than do the reported births, as more male than female births have been under-reported.

The empirical analysis in this paper is undertaken in the following way. In the following section, data and methods used in this paper are discussed. Section three presents background information of the county and township where the survey was conducted and characteristics of the sample women including their childbearing history. In section four, patterns of induced abortions and sex ratios at birth are examined, together with fertility preferences. Section five describes women's knowledge on methods for prenatal sex identification, focusing on ultrasound, the most widely acknowledged and practiced method. Section six focuses on sex-selective abortions and some of the demographic characteristics associated with sex-selective abortions. Section seven conducts multivariate analyses (logistic regression) of the factors affecting the practice of sex-selective abortion. Section eight discusses the cultural context of son preference associated with the practice of sex-selective abortion. Finally conclusions are drawn in section nine.

DATA AND METHODS

Although there is debate that population statistics in China in the recent decade is subject to under-reporting to varying extent in different national surveys, scholars argue that they can obtain accurate data from the peasants if they do a survey themselves, not through the government channels (Interview 2003). My survey experience in China over the last 10 years demonstrates that Chinese peasants are always cooperative and virtually never refuse to answer your questions. In fact sometimes, I was touched by their over-enthusiasm in participating in a survey. In talking to one person, not only the person him/herself but also the neighbours will participate and provide mutually compensating answers.

Family planning in China, however, is a sensitive issue particularly regarding induced abortion. Misuse of induced abortion in China for sex-selection is unfortunately (but not necessarily appropriately) linked to the implementation of the family planning policy. As a result, studies on induced abortion particularly sex-selective abortion are rare and discouraged in China. The few available studies in China on SRB suggesting the practice of sex-selective abortion provide only indirect evidence on this issue. The first attempt for obtaining direct information on sex-selective abortion is the research by Chu Junhong (2001) who conducted a questionnaire survey and some interviews in a county in Central China where rural SRB is much higher than the average rural China. As pointed out by Chu, the information she obtained may represent the extreme (most serious) rather than the typical situation as a result of both the selection of the survey site and the method of "kinship networking" to collect the information.

When efforts at the regional or national level to collect information regarding sex-selective abortion are impossible, local studies are useful to provide insight into this issue. My survey

in East China is an effort of this kind, and involves some innovations as compared to Chu's.[3] Although site selection cannot avoid some arbitrariness (when taking into consideration the time and money involved), one of the considerations for choosing East China is because its SRB stood relatively closely to the national average of SRB. Information obtained in East China should represent the less extreme situation than that from Central China provinces accommodating a much-higher SRB than the national average.

The study county is a medium-sized one in terms of population. A township in the northeast of the county was chosen for the questionnare survey. Since 1998 the county's family planning information has been computerized, standardized software for family planning management is used to keep detailed records of every woman at childbearing age of her information in background characteristics and fertility history, contraceptive use and migration status. The records are updated at a monthly basis at the township level, and reported to the county family planning commission at the beginning of each month (5^{th} of each month). Taking advantage of this, my survey sample was drawn from the computerized sample frame of the reproductive age women. There are 15 villages in the survey township, 5 villages were randomly chosen, and 1605 married women aged 20-45 were randomly selected from these 5 villages.[4]

The 10 survey interviewers (5 males and 5 females) are from two middle schools in the township (The township has two middle schools located at the township town while every village in the township has its own primary school), they are the middle school teachers with either a non-agricultural or agricultural household registration (*Hukou*). Those holding non-agricultural *Hukou* are usually the college graduates who are assigned to work in the middle schools, while others having agricultural *Hukou* are the previous middle school graduates and have been teaching in the middle schools for fairly long time. At the township level, because of the shortage of teachers and university graduates being unwilling to work at the township middle schools, many of the middle school teachers are the previous middle school graduates. They are usually holding agricultural *Hukou* while paid by the township government, and some of them who have worked for very long time are transferred their *Hukou* from agricultural into non-agricultural. The teachers of non-agricultural *Hukou* are paid by the county government. Most of the middle school teachers are originated from the villages in the township and are still living in the original villages. Some who live in the township town have their spouses or/and parents in the original villages and thus keep frequent contact and commuting with their villages.

[3] The major innovations are random selection of the sample, employing middle school teachers to be the interviewers, and more detailed questions in sex-selective abortions providing additional information on ultrasound use for prenatal sex identification and gestation period of sex-selective abortions.

[4] The 15 villages were numbered from 1 through 15 in the computer database; I picked up number 2, then drew the next numbers with an interval of 3. Put together all married women aged 20-45 from the selected 5 villages, numbered them from 1 through 3210. The sample of my survey is half of these women. I again picked up number 2 and selected the rest with an interval of 1, thus obtained a sample size of 1605 married women aged 20-45.

There are two advantages of picking up the middle school teachers to be the survey interviewers: First, they are originated from the villages and know everything happened in the villages; Second, they are the teachers teaching the children from the villages, they are admired and respected by the villagers, and both the children and their parents in the villages listen to what they say, thus they can get accurate information from the villages. The survey strategy based on selecting the sample randomly and employing middle school teachers warrants a good data quality of the survey.

The survey was conducted between October and December 2002. It is interesting to note that in every village in the township, during November and December every year, a one-day festival takes place successively from one village to another. The festival does not have an official name, but it is a local tradition for many years. The festival is more important than the Spring Festival (Chinese New Year which usually occurs between mid-January to mid-February). Important events such as marriage, longevity celebration of old people, and ceremony to worship ancestors usually take place at this festival rather than at the Spring Festival. Thus it is an important occasion when all family members gather together. I was told by the villagers that they usually spend much more money in this festival than in the Spring Festival. One household I interviewed told me that on preparing food, they spent 3000 yuan in the last year's festival (they expected 50 relatives coming), but they only spent 1000 yuan during the Spring Festival. A survey at this time ensures the completeness of the selected women and provides a rare chance to observe the traditional local customs that have important demographic implications.

BACKGROUND INFORMATION

The County The County has a history of nearly 2000 years (the County's data that followed are the unpublished statistics provided by the County Family Planning Commission). It is a small county in land area, medium-sized in population but fairly large in economy. While the county's population is largely rural (62%), its economy is predominantly non-agricultural. Of the total economic output, 50% are industrial and 30% tertiary, only 20% agricultural. The county's economic performance falls into the upper panel of China's 3000 counties (cities).

Township enterprises, having involved a rapid process of privatisation over the last decade, are the major pillar of the county's economy. 70% of the rural labours are employed in township, village or private enterprises. Cash earned from the non-agricultural activities is largely spent in children's education (around 10-50 thousand yuan) and marriage (building a house and paying bride price which could cost 100-150 thousand yuan), which has become much more expensive over the recent decade.

The County has a convenient and effective transportation network linking the county centre to not only the provincial capital and the province's other counties but also all the townships

and villages within the county. High quality highways are built in such a way that one-hour bus drive can reach the furthest corner of the county. As rivers and lakes constitute much of the county, waterway transportation is also fairly well developed.

The County has four public hospitals and several specialized clinics in the county town dealing with all sorts of medicines. The hospitals are well equipped with both domestic and foreign made medical facilities. The family planning service station stands out prominently for offering reproductive health services including induced abortion. Typically township family planning commissions send women who are required to have abortion or sterilization to the county family planning service station to obtain these operations.

The County inaugurated the family planning policy at the early 1970s, but did not well implement it until the early 1980s (Interview 2002a). A family planning office was set up in 1978 in the county's Bureau of Health, and the County Family Planning Commission was not established separately until 1988. During the late 1970s, the family planning policy was "One child is not too few and two children are not too many". In the early 1980s, the family planing policy was largely implemented by induced abortion and sterilization (for women who already had two children). In the mid-1980s, under the opening "a small hole" policy, family planning work was considerably deteriorated. The situation was not improved until the mid-1990s primarily through running campaigns aiming at induced abortions. A pre-pregnancy management approach was initiated in 1995, promoting universal contraceptive use and effectiveness to avoid unauthorized pregnancies rather than taking "remedial measures" after being conceived. In 2000, a quality of care approach was carried out county-wide, mainly involving informed choice of contraceptives and improving women's reproductive health. Contraceptives and family planning operations are provided free of charge. In addition, women who obtained the operations are encouraged with 50 yuan allowance (one person-time). Fertility has declined considerably, the modal fertility preference is two children with one son at best. SRB stands at about 110 in recent years. Prenatal sex identification and sex-selective abortion are strictly forbidden, and severe punishments or penalties are applied when such illegal practices occur and are discovered. However, this has proved to be a tough problem, as there is not an appropriate and effective way to monitor the situation.

The Township The Township, where the questionnaire survey was conducted, is roughly at the average level of the county in terms of socio-economic development. However, according to the Township Family Planning Commission, family planning work in the township is at the "backward" panel in the county largely because of the strong son preference. A rough observation in a small village near the township town clarifies that virtually all the peasants who have a daughter to be their first child have subsequently had a son. This is virtually impossible if no deliberate intervention is applied.

Both the township hospital and family planning service station are equipped with ultrasound B-machine in addition to other modern equipment. The charge for one-time use of ultrasound is at 30 yuan. On the door of the ultrasound room, there is written strikingly "Prenatal sex identification is strictly prohibited".

One of the difficulties in the family planning work in the township is that with the floating population. A large amount of migrant workers are employed in the various enterprises throughout the township. Migrant workers typically come from Western China provinces. The migrant workers are not well paid but have fertility well above the local average. The main method to deal with migrant workers' family planning involves inspecting them regularly and asking them to leave the township if they were found to be pregnant for multiple childbearing (Interview 2002b).

Quality of care approach in family planning carried out in the township involves not only quality service for the reproductive women but also the incentives for the village family planning cadres (Interview 2002c). Three persons are responsible for the family planning work in each village: the village head, village party committee secretary and village women's head. For the village head and party committee secretary, additional allowance is provided by the township government while they are formally paid for their leadership positions. The women's head is the one most directly involved in the village family planning work. She is not only paid for this duty but also provided with old-age insurance.

The Township is currently to be one of the two experimental areas in the county for practicing villagers autonomy and self-governance in family planning (Township government document, No.46, 2002). This has been a noticeable trend in much of China in recent years.

The Sample Women The total randomly selected sample of women is 1605, however, due to migration, the actually interviewed women number is 1602. These are married women with age ranging from 20-45 and a mean age of 32.5 years. Age at first marriage has a low of 15 and a high of 32, averaging at 21.3 years.

The percentage of women who have primary or less education, junior middle-school education and senior middle-school or more education is 24%, 64% and 14% respectively, with the average number of years of their schooling being 7.6. 40% have had the experience of being a migrant worker in towns or cities inside or outside the county. Some of them have worked or are still working in Shanghai or Beijing. At the time of survey, 41% were mainly engaged in farming, 25% in housework and 34% in non-agricultural activities. Non-agricultural activities are mainly the ones in village enterprises (each village usually has 1-3 enterprises).

There are not few cases in which female migrant workers have married with the local males, some of which are *de facto* unions without having legal registration but having cohabited for

a fairly long time with 1 or 2 children. Marriages with migrant workers cost much less and husbands have more control power over their wives. Some of the early marriages are of this kind, as the young female migrants want to have a stable life as early as possible and also find the place richer and more developed than their hometown.

Women and elder parents are largely responsible for the farming work. As the cultivated land is only 0.6 *mu* per head, farming, in all likelihood, is not busy. In fact, a lot of farming fields have been deserted largely as a result of very low economic returns. At the same time, migrant workers are increasingly involved in farming while they are also employed in the village enterprises.

Women's income ranges from a low of 500 to a high of 120 thousand yuan, averaging at 7000 yuan. Ownership of bikes, colour TV sets, refrigerators and phones is universal. Computers and Internet are used by some of them for collecting information of supply and demand for their agricultural and industrial products and also advertising them.

Fertility history data collected from the survey show that 3072 pregnancies occurred to the sample women, of which 77% were live births and 18% induced abortions (Table 1). Women have on average had 1.5 children ever born and 0.3 induced abortions. Since the sample women have not completed childbearing, the mean number of children ever born is not their completed fertility. As the case of China (particularly East China) today, women at age 30 would generally complete 90% of their lifetime fertility, while women at age 35 would complete nearly 100% of the lifetime fertility, a rough calculation of the average completed fertility of the sample women results in 1.6 number of births when taking into account the average age of the sample women and the assumption of even distribution of births over the age range. Thus, the fertility of the sample women stands at a level far below replacement.

Table 1

Table 2 compares the number and timing of various fertility events between the sample population and rural China as a whole. While the timing and spacing characteristics are rather similar, the sample women have lower fertility and higher abortion rate.

The sample women's average number of 1.5 births is distributed between a mean number of male births 0.79 and female births 0.69, SRB stands at 115.3. Although strong son preference persists, abandonment of female infants rarely occurs and infanticide has never occurred at least among the sample women. Two cases of infant abandonment occurred 20 years ago at the beginning of the one-child policy. People do not know who abandoned the two female infants but tend to believe they were from other townships. When the two female infants were abandoned, they were hanged on the doors of two households. The couple who adopted one of the infants were happy at that time because they had a son and were unable to have a second child according to the family planning policy.

Table 2

With fertility dropping to far below the replacement level, birth spacing has lengthened. According to a village women' head interviewed, as a result of increased education, non-agricultural job opportunities and marriage costs, young people are marrying later and having longer birth spacing. As shown in Table 2, the sample women have an average age at marriage and first and second birth of 21.3, 22.6 and 26.4 years respectively. Thus the interval between first marriage and first birth was 1.3 years and the interval between the first and second birth 3.8 years. The government's fertility policy is 1.5 children per couple (one-child policy when the first birth is a boy while two-child policy when the first birth is a girl), and policy for minimum age for female marriage is 20 years and the spacing between the first and second birth is 4 years. Thus the sample women at large are complying with these policies.

PATTERNS OF INDUCED ABORTION AND SEX RATIO AT BIRTH

Evaluation of the patterns of induced abortion and SRB provides preliminary but important insight into the extent of sex-selective abortion which is presumed to be the only cause of the abnormally high SRB in the study villages. While biological SRB does varies across the nations, normal values are found to lie between 103-107 males per 100 females around the world (Chahnazarian 1988; Waldron 1998). SRB that substantially deviates from this normal range imply deliberate interventions to the roughly equal probability of a male and female birth. Table 3 presents the patterns of induced abortion and SRB occurring to the sample population. Fertility history data collected in the survey show that virtually all the fertility events were occurring to the sample women in the post-one-child-policy period (98.8% of the births and 99.7% of the induced abortions).

Table 3

The overall SRB of the sample women stood at 115.3. Table 3 shows that SRB varies substantially across time, birth order and education level, while there is no marked difference between the two broad age groups and across income level. The distorted SRB is largely a phenomenon of the recent period, 2nd or higher order births and higher educated women. Abortion ratio is correspondingly higher in these groups than their counterparts. This is likely to be an indication of the extent of sex-selective abortion practiced in these groups that caused their very high SRBs.

Sex-selective abortion is the proximate determinant of the rising SRB, while culturally and economically determined son preference in the Chinese society is the root of the issue. In order to capture the extent of son preference, there is a range of questions in the survey asking the ideal number of children and ideal sex composition of the children and the desired

sex of the birth at each pregnancy. Generally child preference in China is expressed to be son preference plus preference for a balanced sex composition of two children. This has been documented consistently over the range of surveys in China over the last two decades (Jiang 2002).

Of the sample women, 22% want to have only one child, while 76% want to have two children. 97% of the women wanting two children prefer to have both a boy and a girl child, while slightly higher percentage (1.8%) want two daughters versus the percentage preferring two sons (1.4%). As a result, sex ratio of the ideal two children stands only at 99.3. However, among the women wanting only one child, 46% prefer to have a son, 28% to have a daughter and 26% prefer either sex. Thus, the sex ratio of the ideal one child, when assigning values of 50% sons and 50% daughters for preference of either sex, is very high at 144.3. After taking into account of the women wanting more than three children, the overall sex ratio of the ideal number of children stands at a moderately high of 109.1, lower than the actual SRB of these women. Thus, in this ideal situation, women's child number preference is below replacement fertility (the average ideal number of children is 1.8) but son preference persists (largely because of strong son preference among the women wanting only one child).

However, when the question was asked to women at each pregnancy what sex of the child they desired, the desired SRB is surprisingly high. While the ideal SRB is at 109.1, the desired SRB stands at 143.1. Table 4 shows that, across the birth order, the desired SRB exceeds the actual SRB by an increasingly larger amount. Looking at SRB more concretely, at each birth order, women desired for a son are actually much more likely to have obtained a son, while women desired for a daughter are also more likely to have had the daughter at the first two birth orders. For birth order 3 plus, highly male-biased sex selective childbearing was occurring regardless women's sex preference. Impressively, women without sex preference have had the normal SRB across the birth order. The results show that women's ideal fertility preference, desired fertility preference and actual fertility outcome can differ tremendously. But overall strong son preference is obvious.

Table 4

Despite the very high desired SRB at the first birth, people rarely exercise interventions to achieve their desire. Virtually all women interviewed expressed that they do not care about the sex of the first child, and some even said they want their first child to be a girl, because according to the family planning policy they can have a second child whose sex could be ensured to be a boy through sex-selective abortion, consequently meeting their preference of a balanced sex composition of two children.

At birth order 2, people began to deliberately take prebirth interventions much further increasing the likelihood of a male birth when the first child is a girl, and increasingly do so at higher birth order in the absence of a son.

With the son preference, women's abortion rate may differ according to the sex of the previous children even if sex-selective abortions are not used (Arnold et al. 2002). Table 5 presents the percentages of pregnancies ending in induced abortion or live-birth over the 10 years before the survey according to the sex of living children in 1992. Abortion rate is much higher for women having only sons than those having only daughters, and the women with only daughters have 2 or more times of the male birth rate than that of the women with only sons. Again, son preference plus a preference for a balanced sex composition of children is observed. The highest abortion rate occurred to the women having both sons and daughters, who also exhibit higher male than female birth rate (also an indication of son preference).

Table 5

USE OF METHODS FOR SEX IDENTIFICATION

In China, modern as well as traditional methods have been used for the purpose of sex identification of a foetus. Traditional methods, including pulse diagnosis and herbal medicines, were widely used in rural areas well before the introduction of the modern technologies. A study by Peng and Huang (1999) in Central China found that the traditional Chinese method, pulse diagnosis, was proved to be 84% accurate in identifying the sex of a foetus. Traditional methods continue to avail in rural areas despite the rapid expansion of the modern technologies.

Modern methods for prebirth sex identification, including ultrasound, amniocentesis and chorionic villus sampling, began to be used in some Asian populations in the late 1970s and early 1980s, and spread quickly in China in the 1990s. However, the ultrasound B-scan is the predominant and most widely available method in China. As reliable and convenient as it is, virtually everyone knows B-*chao* (Chinese term for ultrasound B-scan). This awareness is partly established by the family planning program which carries out pregnancy checkups regularly (but not compulsorily) for women at childbearing ages to monitor the use of contraceptives and occurrence of unauthorized pregnancies, as well as the development of a foetus. Other two modern methods are rarely known, let along practiced in rural areas.

In the study villages, 76% of the interviewed women know ultrasound, 36% know pulse diagnosis, only 9% know amniocentesis (Table 6). However, most of the women did not use these methods for prenatal sex identification. Roughly 12% used ultrasound and 7% used pulse diagnosis for sex identification. For women who know these methods, they were also asked the sources of their knowledge. Table 7 shows that more than 50% obtained the knowledge of ultrasound and pulse diagnosis from relatives, friends and neighbours, and another more than 20% from medical personnel. When asked which method people usually trust, most women (72%) said ultrasound. People tend to trust in what they know well and

practice often. Although pulse diagnosis is fairly widely known, it is the method that people least trust.

Table 6

Table 7

65% of the interviewed women believe that the practice of ultrasound is universal, however, only 33% of the pregnancies were examined at least once using ultrasound. Among these pregnancies, 42% used ultrasound once, 34% used twice and 24% three times or more. Multiple use often involved sex identification and obtaining the service at different places for cross-check of the accuracy of sex identification. A general impression from interviews from the study villages is that supportive views for sex identification are widespread, however, practices mostly occur after the first birth.

A question was asked to women who obtained ultrasound B-scan at least once about the purpose of ultrasound use. A clear pattern is observed, as shown in Table 8. Overall, 28% of ultrasound use was for sex identification, this proportion rose perspicuously from the 1st to 2nd and 3rd plus pregnancy. Few women obtained ultrasound at the 1st pregnancy for sex identification, while most women did so at the 3rd or higher order pregnancy. During the interview, a 62-year-old woman told me that wives nowadays are luckier to have the modern technology. She has 4 children, but the first three are daughters. If ultrasound for sex identification was available at her time having children, she would only want two children by stopping at the second birth with an ensured son through ultrasound. A more impressive example is a 59-year-old woman who has three sons. While she is much admired by many other women who have only daughters, both herself and her husband said that they only want two children if the second is a daughter. Why they continued to have the second and third birth is because they wanted a daughter, but unfortunately they had to stop at three sons. Bringing up three sons is a huge burden, this could be avoided if the modern technology was available during the 1970s.

Table 8

Two questions were asked about the first use of ultrasound: first use of ultrasound occurred at what gestation period and where. As Table 9 indicates, the majority of the first use occurred at second-trimester pregnancies. The higher the pregnancy order, the more likely the first use occurred at late gestation period (not shown in the Table). 65% of the first use occurred at hospitals, 16% at family planning stations and 17% at private clinics (Table 10). Across the pregnancy order, the proportion occurred at family planning stations remain lowest and similar, the proportion at hospitals declined by a half while the proportion at private clinics increased 7 fold. The patterns observed in Tables 9 and 10 strongly suggest that ultrasound was used at 2nd and higher order pregnancy for identifying the sex of the foetus.

Table 9

Table 10

Usual health check by ultrasound per person-time costs 30 yuan at the township hospital (Interview 2002d). However, when bribing, the practitioner may take the risk of illegal medical practice in identifying a foetus' sex for the pregnant woman. I was told a story that a doctor in the township hospital has his family in one of the study villages, many years ago a couple who are relative of the doctor's wife in the village sought help from this doctor for introducing the ultrasound practitioner, they bribed the doctor with 200 yuan and some good brand wine and obtained the ultrasound service in the evening when the hospital was closed. I was also told there was a lawsuit case last year in the county hospital where a couple induced abortion of a male foetus while the doctor told them it was a female foetus during ultrasound. As both sides were illegal, they were punished, the doctor was removed from his post. Some private clinics increasingly ran the risk for an increasingly high price. The price of ultrasound B-scan for sex identification went up from 300 to 500, 700 and even 1000 yuan in private clinics in recent past. Last year, great efforts and severe penalties were conduced in the county to clean up all the private clinics with an ultrasound B-machine. Administrative punishment, heavy fine and revoking the medical licence were applied concurrently. The director of the County Family Planning Commission told me that they punished a doctor who told the sex of the foetus of a pregnant woman who had the first pregnancy and just wanted to know the child's sex not for sex-selective purpose. This woman is an urban resident and is a friend of the director and was just delighted in expecting to have a child and was curious about the sex of the child. The local regulation stipulates that in any circumstances sex identification is prohibited.

However, interviews with some family planning cadres find that use of ultrasound for sex identification is partly supported by themselves. They think one son is necessary while two or more than two sons are too many, and it is by all means reasonable to have one son through use of ultrasound and sex-selective abortion. They argued that practice of ultrasound and sex-selective abortion facilitates the implementation of family planning policy, and indeed, the family planning work becomes much more easier at present than before when more and more peasants no more want two or more children but at least one son through practice of ultrasound and sex-selective abortion. Interestingly one of the male interviewers expressed his unique idea on this topic: "I would suggest an ideal family planning policy of two children consisting one son and one daughter. Couples with first child to be a daughter can legally practice prenatal sex identification and sex-selective abortion in order to have a son at second birth, while couples with first child to be a son can also do so in order to have an additional daughter. Then the couples are sterilized after achieving the two children of a balanced sex composition. I think this will solve all the problems in family planning. Fertility is low, sex ratio is balanced and family planning work will be very easy and successful."

SEX-SELECTIVE ABORTIONS

Direct evidence of sex-selective abortions was obtained in the study villages. Before going into the details of the data, a simple simulation is given to assess the importance of impact of sex-selective abortion on SRB. Table 11 is the results produced from a very simple simulation in which all women will have 1 to 6 children with a biological SRB of 105. When the number of children increase, the proportion of women with only daughters decline quickly. In this situation (without sex preference), SRB will be exactly at 105 at all parity. However, starting from parity 5, if 100% of the women with only daughters practiced sex-selective abortion to ensure a son, then SRB would ascend quickly when fertility decline. Even if all women have 4 children (fairly high fertility), sex-selective abortion occurring to the 5.7% women with only daughters at parity 4 would lead to an abnormally hight SRB of 111.1. With this in mind, the further increased SRB in China over the last decade is theoretically possible a result from merely the practice of sex-selective abortion.

Table 11

In the study villages, direct information is obtained on sex-selective abortion by asking women whether or not they obtained sex-selective abortion after the sex of the foetus is determined through ultrasound. 5.6% of the women obtained sex-selective abortions. Table 12 shows that among the 109 sex-selective abortions, 101 or 93% are the female foetus aborted.

Table 12

When looking at the reason for obtaining an abortion, 20% of the abortions are sex-selective (Table 13). This percentage increased from 8% at 1st pregnancy to more than a double at 2nd pregnancy and nearly a triple at 3rd plus pregnancy. Sex-selective abortions were largely obtained after the first birth. Table 13 also shows that contraceptive failure constitute one of the major reasons for obtaining abortions particularly at higher order pregnancies. It is interesting to observe the pattern associated with the most important reason that differs across the pregnancy order: personal reasons (58%) at 1st pregnancy, policy restriction (44%) at 2nd pregnancy and contraceptive failure (41%) at the 3rd plus pregnancy. Such a pattern is typical of rural China.

Table 13

As clearly shown in Table 14, gestation period of sex-selective abortions contrast sharply to that of non-sex-selective purpose. While 85% of the non-sex-selective abortions are first-trimester procedures, 95% of the sex-selective abortions are obtained at second- (85%) or even third-trimester (10%) pregnancy, despite the fact that 60% of the interviewed women are aware that late-term abortions are associated with serious health consequences. However, nearly 60% of the interviewed women are unaware of the illegalness of sex-selective abortion.

Table 14

FACTORS AFFECTING SEX-SELECTIVE ABORTION

After examining patterns and characteristics of sex-selective abortion, this section looks into the factors affecting sex-selective abortion. Data were collected on women's attitudinal variables as well as their demographic and socio-economic characteristics. This section conducts multivariate analyses of sex-selective abortion to reveal the influential factors with statistical controls.

Data from two questions underlies the dependent variables. Whether a woman knows ultrasound can be used for identifying the sex of a foetus, as shown in Table 6, is the dependent variable in the first model examining the factors affecting women's knowledge of methods for prenatal sex identification. Whether a woman obtains a sex-selective abortion after identifying the sex of a foetus through ultrasound, as shown in Table 12, is the dependent variable in the second model examining the factors affecting women's practice of sex-selective abortion. Since the dependent variables are binary, coded 1 if yes and 0 if no, logistic regression is an appropriate multivariate method used here to analyse the effects of the demographic and socio-economic factors on women's knowledge and practice of sex-selective abortion. The basic equation of the logistic regression is:

$$\ln\left(\frac{p}{1-p}\right) = b_0 + b_1 X_1 + b_2 X_2 \ldots b_n X_n ,$$

where the dependent variable is specified in terms of the odds of a woman having the knowledge of methods for prenatal sex identification (in the first model) or a woman having obtained a sex-selective abortion (in the second model), $\frac{p}{1-p}$; the variables X_i (i =1, 2, …, n) on the right-hand side of the equation represent the independent variables.

For the knowledge model, there are 7 independent variables, however, 6 are categorical and are thus recoded as dummy variables. Women's education attainments are divided as "Primary school or lower", "Junior middle school" and "Senior middle school plus", "Primary school or lower" is the reference category. Income level is classified as "Low income", "Medium income" and "High income", "Low income" is the reference group. A question was asked if the woman has the experience to be a migrant worker in towns or cities, the variable that captures this is "Migration experience" (versus "No migration experience" if the woman did not have the experience). "Non-agricultural work" represents the major economic activity a woman is engaged as versus "Agricultural work". Two attitudinal variables capture women's desire for a son: family line continuation by sons (Do you think only sons can carry on the family line?) and old-age support by sons (Who will provide old-age support to you?). "Family line continuation by son" and "Old-age support by son" are both dummy for sons. Finally "Age" is an interval variable representing a woman's age in

years. Table 15 is the logistic regression results for the factors affecting women's knowledge of ultrasound for sex identification.

Table 15

Most of the socio-economic variables have a significant impact on women's knowledge. Older women are less likely to have the knowledge. The age effect is significant but small. The higher a woman's education, the more likely the woman has the knowledge. The significant odds ratio for junior and senior secondary plus educated women is 1.8 and 2.6 times that of the least educated women, respectively. Income does not significantly influence women's knowledge. Women's migration experience does influence women's knowledge significantly, women who has the experience is 1.8 times more likely than those without the experience to have the knowledge. Women being a migrant worker in the cities are exposed to all sorts of latest information and share the experiences of others, thus are more likely to have the knowledge under consideration. The same applies to women involved in non-agricultural activities, as women doing non-agricultural work has the odds of the knowledge that is 33% greater than that of women engaging in agricultural activities. Women who believe only sons can carry on the family line are significantly more likely to have the knowledge. This association could be established by strong son preference generated from this belief which turned into seeking information for method of sex-selection. However, women's attitude towards sons' role in old-age support does not significantly affect their knowledge although the effect is on the expected direction in the multivariate model.

Women's knowledge of method for sex-selection is the first step towards the practice of sex-selective abortion. Table 16 models the factors affecting women's practice of sex-selective abortion. The socio-economic variables in the model are the same as those in the "knowledge" model, in addition, few demographic variables are added. "Period a birth occurred" is a variable indicating the period when a birth occurred. Period is broadly divided into "Before 1990" and "After 1990", hypothesising that births occurred in the period after 1990 are more likely to be sex-selective. Since son preference is documented to be particularly associated with female births, the variable "Sex composition of children" is entered into the model to test this association. Women's age and number of births are the control variables.

Table 16

Results are interesting in that all of the socio-economic variables are not significant while most of the demographic and attitudinal variables are significantly affecting women's practice of sex-selective abortion. Although more educated women are more knowledgeable,

they are not necessarily more likely to practice sex-selective abortions.[5] Income variables are not significant in the model although their effects are on a consistent direction. Migration experience does not significantly influence women's practice of sex-selective abortion. Women's economic activity has a coefficient that is not statistically different from zero. The traditional belief of continuation of family line by sons has highly significant effect, leading to women to obtain sex-selective abortion 3 times more likely. The view towards sons' utility of old-age support also significantly affects the likelihood of obtaining sex-selective abortion: women holding this view is 2 times more likely to obtain a sex-selective abortion. The period a birth occurred has a highly significant impact, suggesting that births occurred in the recent period are much (5.5 times) more likely to be sex-selective. A more impressive finding is the very high and significant odds ratio for "All girls". If women's births are all girls, they would more than 6.5 times more likely to practice sex-selective abortion than those with all male births. Also women who have both male and female births have a significant odds of obtained a sex-selective abortion that is nearly 3 times that of the women with all male births. This findings are expected and also supportive to many of the similar situations reported elsewhere (Poston et al. 1997; Graham et al. 1998; Qiao 2002; Chen 2002). A general conclusion is that in the study villages, practice of sex-selective abortion is significantly influenced by the cultural belief that only sons can carry on the family line, and to a lesser extent, by the economic consideration of old-age support by sons. With the increased desire for a smaller family size in the recent period, births are much more likely to be sex-selective now than past. This may also apply to rural China as a whole witnessing pronounced increased in SRB following female births over the last decade.

CIRCUMSTANCES SURROUNDING SON PREFERENCE

Sex-selective abortion leading to abnormal SRB in the study area, as well as in China in general, is associated with the son preference inherent in the socio-cultural institutions of Chinese society. It seems that while China's family planning program and socio-economic changes have brought about the most dramatic demographic transition—unprecedented fertility decline, son preference plus the same reproductive technology have resulted in another similarly unprecedented demographic transition—a transition from low, normal SRB to high, abnormal SRB. China's economic reform and modernization have substantially changed the context in which Chinese peasants live and work; to adjust to this change, they no longer want many (more than two) children. However, the traditional marriage and family system has not been eroded, and son preference persists. Modern technologies mediate these two conflicting processes, resulting in rising SRB.

Zhao (1997) has convincingly argued that Chinese peasants were not producing as many children as biologically capable over the history, rather they were achieving family size and

[5] More educated women, in many instances, resort to pre-pregnancy selection rather than sex-selective abortion. I saw a book for agricultural affairs in one of the families interviewed introducing some methods for pre-pregnancy selection.

structure goals through family-building strategies involving deliberate control via spacing, abortion and adoption. Interviews with some oldest old people in the study villages find that in most cases, they prefer to have 3-4 children (at least two sons) and state that they have actually had more children than they wanted. While child number preference has declined much from the old to the young generation, son preference remains strong.

Fertility preference has three components: how many, at what time and what sex. Traditionally Chinese peasants want many children, have early childbearing and prefer sons to daughters. This is determined both culturally and economically. When the peasants in the study villages were asked why they want children and why they want at least a son, they laughed, implying that this is just a natural process without justification. It's natural and common that when children reach 20 years old or so, the surrounding people will ask and care about whether they have found their marital families. When a couple has married for a few months, the neighbours will also be gossiping if the bride is pregnant. Indeed, some of the young kids who migrated to towns or cities for jobs told me one of the reasons why they migrated is to avoid the gossip and hence the pressure from the villagers.

To understand the fertility preference of the Chinese peasants, one needs to understand the "life world" in which the peasants live (Chen and Mu 1996). Living in the "life world" rooted in a village culture, the ultimate life goal of the peasants is to carry on the family line and contribute to family prosperity. Peasants see themselves to be a section of the chain of life that has descended from the ancestors, it is their indispensable mission to carry on the chain. To have children or to have male children is a necessary prerequisite to perpetuate the chain from generation to generation. Indeed, from the village study, it is found that having and bringing up a male child is by all means economically losing. A male child's economic costs are always larger than the benefits to his parents both now and past.

Childbearing demands of the Chinese peasants are an integration of a range of normative requirements and secular considerations. The most fundamental is the demand of the ultimate life value, that is, what they live for, which is achieved by having children. Happiness of life is largely involving having children, and a family is only complete when there are children. The villages under study use a very plain language to state this demand: To be human is to produce human beings. To have children, bring them up, get them married, have grandchildren, receive filial piety and worship from children and grandchildren, and to have themselves to be ancestors. Following this cultural arrangement, their life values and desires are achieved at different stages in their life-long pursuit of family building, continuation and prosperity. Younger generations are reproduced with the similar cultural values and behavioural norms, and elder parents place hopes on them to realize what they have been unable to achieve particularly in "bringing honour to their ancestors" (*Guang Zong Yao Zu*). Thus, to get married and to have children is more than natural without involving any justification.

Associated with son preference is the patri-based family continuation, which is a cultural or institutional arrangement in a patriarchal society: patri-based right of inheritance of family name and property (Ye 2002). The Confucian patriarchal tradition in China is typically patricentric (*Fu Quan*), patrilineal (*Fu Xi*) and patrilocal (*Fu Ju*). Patricentricity is associated with labour division between the two sexes in such a way that husbands and adult males are responsible for the field work and earnings outside home while females for housework and childcare at home, and with inequalities in income distribution and in decision-making power over household affairs between the two sexes. Patrilineality and patrilocality deny women's rights in inheriting family name and property, providing old-age support and joining in ceremony to worship the ancestors and handling the funeral affairs of the senior. As one of the traditional beliefs (a famous saying of Mencius) states that "Of all unfilial deeds none is more serious than the failure to produce male descendants" (*Bu Xiao You San Wu Hou Wei Da*), "May you have no male heir!" (*Duan Zi Jue Sun*) becomes the most venomous curse to any family in China.

Socio-economic considerations for having children are the most practical elements of the childbearing demands of the peasants. In village culture, power and influence that peasants can exert, reputation that they enjoy and admiring and respect that they receive are usually linked to whether and how many male children they have. A prevailing saying in the study villages goes: "Sons bring good reputation while daughters good fortunate" (*Er Zi Shi Min Qi Nu Er Shi Fu Qi*). Economically, the demand for children is the demand for labour and old-age security. Interestingly peasants believe that they need children's support not only in the present world (when they are alive *Yang Jian*) but also in the nether world (when they are dead *Ying Jian*). Children's support is necessary for them to have a happy life in the nether world.

Both my survey and other studies (see Jiang 2002) in China have documented considerable changes in fertility preference of the Chinese peasants. Peasants no longer want many children and have early childbearing. The traditional belief "More (male) children, more happiness and prosperity" (*Duo Zi Duo Fu*) is no more held by the majority of the peasants. Zhao (1997) even casts doubt on the popularity of this belief in historical China. Indeed, in the study villages, neither the oldest old nor the young couples, agree to this belief. Both their own experience and what they observed elsewhere suggest that many sons not only bring considerable hardships, but also, instead of taking and sharing responsibility in providing quantity and quality support, show unreliability and unfiliality when the several sons compare to each other not to be too outstanding and conflicts frequently occur. On the other hand, costs involved in bringing up a child have grown exponentially over the last two decades with the socio-economic transition in China. The hardships and costs in bringing up two sons today are much more greater than in rearing more than three sons before the economic reform.

However, one son seems to be an unshakable demand. Peasants frequently states that the best choice is "one son and one daughter", less desirable is "an only son or two sons", but

unacceptable is “an only daughter or two daughters”. Implied is a must of having a son. However, peasants think both sons and daughters are important and serve different purposes. In my survey, women were asked the purpose of having a male and female child. The major consideration of having a son includes 43% for continuation of family line, 38% for old-age support, 8% for labour and 5% for strengthening the husband-wife relationship, while the purpose for having a daughter is expressed to be 28% for family completeness, 24% for old-age support, 23% for expansion of relative ties, 14% for help in housework, and also 5% for strengthening the husband-wife relationship.

Persistence of son preference is associated with the fact that sons and daughters are valued more culturally than economically. Historically, there are marked excessive economic benefits of male children when people live on traditional agriculture and receive support in their old-age from sons. However, economic reform has drastically changed the circumstances in which male children are highly economically valued. First, children are increasingly in school before they marry. At the same time, when they graduate from middle school, they either continue having higher education or migrate to cities for non-agricultural jobs. The study county is much over-populated and has considerable surplus agricultural labours where the cultivated land per head is among the lowest in China’s counties. At the same time, mechanization in agriculture has increasingly reduced manual labour-based farming. Labour value of male over female children has become largely non-existent. Second, rural industrialization has substantially enhanced the economic value of female children. More and more females work in rural enterprises in light industries including food processing, handicrafts and clothing etc. Silk embroidery, which is one of the most important and well-known activities in the county, is overwhelmingly a job for females. In much of the tertiary sector, females are much more likely to be employed over a wider range of activities. At the same time, female children tend to contribute more monetary benefits to parents. While average income for a male and female migrant worker in the cities is roughly similar, parents usually receive more remittances from female children. Most of the villagers interviewed state that female children can save more money than male children, as male children largely use up what they earned by drinking, smoking and making friends. However, childrearing costs are much more greater for a male than for a female child. When a daughter marries out, her parents receive a large amount of bride price from the bridegroom’s parents. The bride price is estimated to be at 20 thousand yuan in this county. The bridegroom’s parents need to build a house equipped with furniture and a range of household electronical appliances. The expenditure for this could be as high as 100 thousand yuan. When either of the two conditions is not met, the bride will not marry into the bridegroom’s family. Finally, a male child’s contribution to old-age support does not tend to be much greater than a female child’s despite the fact that daughters are traditionally not obliged to support their parents. When parents are healthy and capable, they tend to live separately and live on their own. They need children’s support only at the very end of their lives when the functional capacities in daily living begin to lose. Villagers state that in terms of financial support, the first source is the spouse, the second is sons and the third is daughters. However, in care giving, the first is still

spouse, the second is daughters and the third is sons or daughters-in-law. Also daughters prepare and pay much more for parents clothing. When a daughter marries out, she is still available to her native family.

Despite the changes described above, peasants still view sons and daughters differently. The crucial difference is that only sons can carry on the family line. Although there are many instances of uxorilocal marriages in which the son-in-law provides old-age support, their daughter's children still inherit the family name of her husband, and their own family name can not be carried on. Also importantly, many rich peasants only want to inherent down the wealth in their own families through sons, while giving the money to daughters means giving the money to other families. These can explain why more developed areas tend to have stronger son preference. In East China, the highest SRB was observed in the areas where rural industrialization occurred most rapidly in China and peasants income is among the highest. In the more developed areas, economic value difference between a male and female child virtually disappears, while cultural value is still predominantly male assumed.

Thus, of the childbearing demands of the peasants, what are cultural and psychological are more resisting and thus slow and difficult to change, while those that are social and economic are more readily to be altered either by the force of modernization or by the implementation of family planning policy. Of the three components of fertility preference of Chinese peasants, the core is the sex preference, more marginal is that concerning number and timing. This is why the number and timing preference is negotiable while son preference strongly persists over the last two decades of family planning implementation. On the one hand, China's family planning program has brought fertility considerably down along with delayed childbearing and lengthened birth spacing; On the other hand, the one-child policy had to be modified to open 'a small hole" for the peasants with daughters only.

CONCLUDING REMARKS

Prenatal sex identification and sex-selective abortion was made illegal in China in 1986 when SRB began to deviate from the normal range (MOH & SFPC 1986). Since then there are more than 10 regulations and notices including laws that have been issued and enforced to prohibit and eliminate such illegal practices. However, SRB continued rising throughout the 1980s and 1990s. In 2001, China enforced a population and family planning law which articulates the circumstances surrounding illegalness and criminal offence of prenatal sex identification and sex-selective abortion (See the translation of the Law by Winckler 2002). Despite these, use of ultrasound for sex identification and sex-selective abortions have been increasingly rampant in much of China. The 2000 population census results show that while SRB stands strikingly high at over 150 for second or higher order births, SRB at first birth tends also to deviate from the normal level. China's 2001 National Family Planning and Reproductive Health Survey (SFPC 2002) even reports an average SRB at first birth of 110.0 between 1996-2001 (106.4 between 1990-1995).

Considerable efforts involving both government officials and scholars have been made to examine the trends and characteristics of SRB in China, and to suggest possible explanations or speculations for the abnormally high SRB. The view that SRB in China is only statistically abnormal largely as a result of under-reporting of female births has been shaken by the county-wide effort in cleaning up the under-reported births, which surprisingly comes up with more male than female birth under-reporting. As female infanticide rarely occurs, the only possible reason has to be sex-selective abortion, as the case of South Korea and Taiwan. To fill the gap in data collection and knowledge on this issue, this study integrate quantitative and qualitative survey to investigate the context and degree of son preference, use of ultrasound for sex dentification and subsequent sex-selective abortion in rural East China.

East China, although more developed than the rest of China, is the first to show abnormally high SRB in the early 1980s. In the early 1990s, abnormally high SRB spread to Central China, and in the early 2000s, further to West China. Geographic expansion of the abnormally high SRB has been coincidently following the spread in time and space of ultrasound B technologies from the costal to inland China (Gu and Xu 1998). This modern invention mediates the two conflicting processes: desire for a smaller family size and persistence of son preference, resulting in increasing deviation of SRB from normality.

Desire for a smaller family size is not the result of solely the implementation of the family planning policy. In East China in particular, the rapid economic growth and radial social changes have dramatically changed the context in which the peasants live and work. Adjusting to this, peasants no longer want more than two children. In fact, in the study villages, peasants did not exhibit very high fertility desire even before the family planning policy. Many old women state they had more children than they wanted, and if reproductive technologies including those sex-selective were available at their time of childbearing, their fertility would be lower. Traditional beliefs surrounding the benefits of many (male) children are fragile, however, the cultural arrangement of son preference in a patriarchal society still dominates the reasoning and practice of childbearing.

Data from the study villages suggest that sex-selective abortion takes virtually solely the responsibility for the abnormally high SRB when there is little evidence of female infanticide, adoption and under-reporting. While 76% and 36% of the interviewed women respectively have the knowledge of ultrasound and pulse diagnosis for sex identification, correspondingly 12% and 7% did so. Subsequently roughly 6% obtained sex-selective abortions. One third of the pregnancies occurred to the sample women were examined by ultrasound, of which 28% were for sex identification. This proportion increased from less than 10% at the first pregnancy to more than 70% at the third and higher order pregnancy. Associated with this, the percentage of obtaining ultrasound in private clinics rose from 6% at the first pregnancy to 44% at the third and higher order pregnancy.

The dominant reason for obtaining an abortion is nevertheless not the sex of the foetus. At first pregnancy, 58% of abortions were associated with personal considerations; at second pregnancy, policy restriction accounted for 44%; while at higher order pregnancy, failure of contraceptives practiced when no more children were desired was responsible for 41%. This is a pattern believed to be typical of rural China. The percentage resulting from undesired sex of the foetus was 8% at first pregnancy, which was doubled and tripled at second and at third plus pregnancy. Among the reported 109 cases of sex-selective abortions, 93% (101 cases) were female foetus. Compared to the abortions for non-selective purpose, sex-selective abortions were largely second- or even third-trimester procedures despite the relatively high awareness of serious health consequences associated with late-term abortions.

Multivariate analysis demonstrates that knowledge of ultrasound for sex identification is associated with such women's characteristics as higher education, migration experience, non-agricultural work and the traditional belief of sons in carrying on the family line. However, practice of sex-selective abortion is associated significantly with demographic rather than socio-economic variables. The belief of sons to continue the family line and to provide the old-age support and the period at which a birth occurs are significantly resulting in sex-selective abortion. Sex-selective abortions are highly significantly more likely to occur in families where all births are girls. With the increased desire for a smaller family size in the recent period, births are much more likely to be sex-selective now than past.

The evidence from this study suggests that son preference would continue when the cultural context of son preference continues, and legislation outlawing the prenatal sex identification could hardly make a difference. The severely biased SRB implies grave consequences in the not far future, and more so in some than in other areas, as debated in some of the recent studies (Li et al. 1995; Guo and Deng 2000; Chen 2002). Suggested by some studies is that social policy beyond family planning addressing gender equity involving empowerment of women and advancement of reproductive health is necessary in reducing the extent of son preference (Gu and Roy 1996; Chu 2001; Qi and Chu 2002). "Eliminating the son preference and stopping prenatal sex determination are the two necessary sides of one coin." (Qi and Chu 2002) However, such an effort poses a great challenge to the society of China which is predominantly rural and has a history of over 2000 years of Confucian ideology.

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TABLE 1

PREGNANCY OUTCOMES

OUTCOMES	CASES	PERCENTAGE	MEAN
Pregnancy	3072	100.00	1.93
Live-birth	2377	77.36	1.48
Induced abortion	540	17.58	0.34
Spontaneous abortion	128	4.17	0.08
Still-birth	27	0.89	0.02

TABLE 2

COMPARISON BETWEEN THE SAMPLE POPULATION AND RURAL CHINA

CHARACTERISTICS	THE SAMPLE WOMEN	RURAL CHINA
Mean values (per woman)		
Pregnancies	1.93	2.20
Births	1.48	1.74
Male births	0.79	0.94
Female births	0.69	0.80
Induced abortions	0.34	0.30
Sex ratio at birth	115.3	116.83
Abortion ratio	22.72	17.41
Timing and spacing (years)		
Age at first marriage	21.28	21.20
Age at first birth	22.62	22.54
Age at second birth	26.43	25.81
Interval between first marriage and first birth	1.34	1.35
Interval between first and second birth	3.81	3.27

Note: Data for rural China come from China 2001 National Family Planning and Reproductive Health Survey. In conformity with the age range of the sample women, data for rural China are also confined to women aged 20-45.

TABLE 3

PATTERNS OF INDUCED ABORTION AND SEX RATIO AT BIRTH

CHARACTERISTICS	MALE BIRTHS	FEMALE BIRTHS	TOTAL BIRTHS	INDUCED ABORTIONS	ABORTION RATIO	SEX RATIO AT BIRTH
Age						
20-34	665	571	1236	326	26.38	116.46
35-45	608	533	1141	214	18.76	114.07
Birth order						
1st	803	753	1556	35	2.25	106.64
2nd	384	296	680	291	42.79	129.73
3rd+	86	55	141	214	151.77	156.36
Period						
Before 1990	516	486	1002	117	11.68	106.17
After 1990	757	617	1374	423	30.79	122.69
Education						
Primary or lower	342	322	664	151	22.74	106.21
Junior middle school	803	682	1485	327	22.02	117.74
Senior middle school +	128	100	228	62	27.19	128.00
Income						
Low	182	157	339	69	20.35	115.92
Medium	882	768	1650	379	22.97	114.84
High	207	177	384	91	23.70	116.95
Total	1273	1104	2377	540	22.72	115.31

TABLE 4

DESIRED AND ACTUAL SEX RATIO AT BIRTH

PREFERENCES	TOTAL BIRTHS	BIRTH ORDER 1	BIRTH ORDER 2	BIRTH ORDER 3+
Desired	143.05	130.80	156.97	264.52
Actual	115.31	106.64	129.73	156.36
Want a son	155.69	130.15	172.56	212.20
Want a daughter	94.79	83.58	97.13	116.67
No preference	102.47	101.99	105.88	105.71

TABLE 5

PERCENTAGE OF PREGNANCIES ENDING IN LIVE BIRTH OR INDUCED ABORTION IN THE 10 YEARS PRECEDING THE SURVEY, ACCORDING TO THE SEX COMBINATION OF THE LIVING CHILDREN IN 1992

NUMBER AND SEX OF LIVING CHILDREN	MALE BIRTH	FEMALE BIRTH	INDUCED ABORTION	NUMBER OF PREGNANCIES
One child				
1 boy	19.39	31.63	42.86	196
1 girl	38.01	20.25	35.20	321
Two children				
2 boys	11.11	22.22	44.44	9
1 boy+1girl	25.00	10.00	57.50	40
2 girls	57.78	11.11	26.67	45
Three or more children				
all boys	-	-	-	0
boys+girls	40.00	0.00	60.00	5
all girls	50.00	10.00	10.00	10

Note: row percentages not necessarily add up to 100 because of pregnancies ending in spontaneous abortions or stillbirths.

TABLE 6

KNOWLEDGE OF METHODS FOR SEX IDENTIFICATION

	ULTRASOUND		AMNIOCENTESIS		PULSE DIAGNOSIS	
WHETHER USE	Cases	%	Cases	%	Cases	%
No	377	23.53	1459	91.07	1028	64.17
Yes and did use	187	11.67	4	0.25	111	6.93
Yes but did not use	1038	64.79	139	8.68	463	28.90
Total	1602	100.00	1602	100.00	1602	100.00

TABLE 7

SOURCE OF KNOWLEDGE OF METHODS FOR SEX IDENTIFICATION

	ULTRASOUND		AMNIOCENTESIS		PULSE DIAGNOSIS	
SOURCES	Cases	%	Cases	%	Cases	%
Family members	74	6.04	8	5.59	79	13.76
Relatives, friends or neighbours	659	53.80	48	33.57	324	56.45
Medical personnel	304	24.82	39	27.27	132	23.00
Family planning personnel	82	6.69	8	5.59	6	1.05
Mass media	104	8.49	40	27.97	32	5.57
Others	2	0.16			1	0.17
Total	1225	100.00	143	100.00	574	100.00

TABLE 8

PURPOSE OF ULTRASOUND USE

PURPOSES	TOTAL		1ST PREGNANCY		2ND PREGNANCY		3RD+ PREGNANCY	
	Cases	%	Cases	%	Cases	%	Cases	%
Usual check	734	71.96	527	91.49	154	60.87	53	27.75
Sex identification	286	28.04	49	8.51	99	39.13	138	72.25
Total	1020	100.00	576	100.00	253	100.00	191	100.00

TABLE 9

GESTATION PERIOD AT WHICH THE FIRST USE OF ULTRASOUND WAS CONDUCTED

MONTH	CASES	%
1	63	6.18
2	71	6.96
3	237	23.24
4	231	22.65
5	185	18.14
6	120	11.76
7	65	6.37
8	41	4.02
9	7	0.69
Total	1020	100.00

TABLE 10

PLACE WHERE THE FIRST USE OF ULTRASOUND WAS CONDUCTED

PLACES	TOTAL		1ST PREGNANCY		2ND PREGNANCY		3RD+ PREGNANCY	
	Cases	%	Cases	%	Cases	%	Cases	%
County hospital	342	33.53	208	36.11	85	33.60	49	25.65
Township hospital	321	31.47	230	39.93	67	26.48	24	12.57
County family planning station	78	7.65	44	7.64	18	7.11	16	8.38
Township family planning station	81	7.94	47	8.16	20	7.91	14	7.33
Private clinic	178	17.45	35	6.08	59	23.32	84	43.98
Others	20	1.96	12	2.08	4	1.58	4	2.09
Total	1020	100.00	576	100.00	253	100.00	191	100.00

TABLE 11

HYPOTHETICAL SITUATIONS OF DISTORTED SRB RESULTED FROM THE PRESUMED SEX-SELECTIVE ABORTIONS

NUMBER OF CHILDREN	% WITH NO SONS	SRB WITH ASSUMED SEX-SELECTIVE ABORTIONS
1	48.78	
2	23.80	171.13
3	11.61	122.66
4	5.66	111.13
5	2.76	107.35
6	1.35	105.46

TABLE 12

SEX-SELECTIVE ABORTIONS

NUMBER OF ABORTIONS	TOTAL	MALE	FEMALE
1	75	8	67
2	12		12
3	2		2
4	1		1
Total number of women	90	8	82
Total number of abortions	109	8	101
% of abortions	100.00	7.34	92.66

TABLE 13

DISTRIBUTION OF ABORTIONS BY REASONS

REASONS	TOTAL		1ST PREGNANCY		2ND PREGNANCY		3RD+ PREGNANCY	
	Cases	%	Cases	%	Cases	%	Cases	%
Contraceptive failure	166	30.74	9	25.00	69	23.79	88	41.12
Policy restriction	191	35.37	3	8.33	128	44.14	60	28.04
Child sex is not ideal	109	20.19	3	8.33	54	18.62	52	24.30
Personal reasons	74	13.70	21	58.33	39	13.45	14	6.54
Total	540	100.00	36	102.86	290	100.00	214	100.00

TABLE 14

GESTATION PERIOD OF INDUCED ABORTIONS

	TOTAL		NON-SEX-SELECTIVE		SEX-SELECTIVE	
MONTH	Cases	%	Cases	%	Cases	%
1	91	16.85	91	21.11		
2	192	35.56	190	44.08	2	1.83
3	89	16.48	86	19.95	3	2.75
4	47	8.70	25	5.80	22	20.18
5	53	9.81	17	3.94	36	33.03
6	46	8.52	11	2.55	35	32.11
7	14	2.59	6	1.39	8	7.34
8	8	1.48	5	1.16	3	2.75
Total	540	100.00	431	100.00	109	100.00

TABLE 15

LOGISTIC REGRESSION MODEL OF THE PROBABILITY WHETHER A WOMAN KNOWS ULTRASOUND CAN BE USED FOR IDENTIFYING THE SEX OF A FOETUS

COVARIATES	NUMBER OF CASES (n)	ODDS RATIO UNIVARIATE MODEL	ODDS RATIO MULTIVARIATE MODEL
Age	1592	0.91***	0.92***
Education			
Primary school or less (ref)	382	1.00	1.00
Junior middle school	1022	2.00***	1.77***
Senior middle school+	188	2.83***	2.62***
Income			
Low income (ref)	373	1.00	1.00
Medium income	955	1.30	1.08
High income	264	1.27	1.07
Migration experience			
No (ref)	951	1.00	1.00
Yes	641	2.43***	1.79***
Major economic activity			
Agricultural work (ref)	1056	1.00	1.00
Non-agricultural work	536	1.58***	1.33*
Family line continuation by son			
No (ref)	990	1.00	1.00
Yes	602	1.21*	1.48**
Old-age support by son			
No (ref)	1013	1.00	1.00
Yes	579	0.93	1.19
Number of observations (N)		1592	1592
Model Chi-square		--	150.69***

*P<0.05; **P<0.01; ***P<0.001. (ref)=reference category. --=Not applicable.

TABLE 16

LOGISTIC REGRESSION MODEL OF THE PROBABILITY WHETHER A WOMAN OBTAINED A SEX-SELECTIVE ABORTION

COVARIATES	NUMBER OF CASES (n)	ODDS RATIO UNIVARIATE MODEL	ODDS RATIO MULTIVARIATE MODEL
Age	1509	0.99	1.01
Number of births	1509	1.79***	1.42
Education			
Primary school or less (ref)	375	1.00	1.00
Junior middle school	974	0.91	1.08
Senior middle school+	160	0.49	0.80
Income			
Low income (ref)	361	1.00	1.00
Medium income	892	1.15	1.17
High income	256	1.81	1.90
Migration experience			
No (ref)	911	1.00	1.00
Yes	598	1.30	1.31
Major economic activity			
Agricultural work (ref)	1013	1.00	1.00
Non-agricultural work	496	0.92	1.17
Family line continuation by son			
No (ref)	932	1.00	1.00
Yes	577	3.27***	2.95***
Old-age support by son			
No (ref)	944	1.00	1.00
Yes	565	1.80**	2.16**
Period a birth occurred			
Before 1990	423	1.00	1.00
After 1990	1086	4.93***	5.48***
Sex composition of children			
All boys	625	1.00	1.00
All girls	429	4.48***	6.51***
Both boys and girls	455	4.44***	2.83**
Number of observations (N)		1509	1509
Model Chi-square		--	92.08***

*P<0.05; **P<0.01; ***P<0.001. (ref)=reference category. --=Not applicable.