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Short Abstract:
Having used the data from the "National Population and Reproductive Health Survey" conducted by the National Family Planning Commission in November 1997, We estimated the overall number of induced abortions, calculate cohort induced abortion frequency, explore the impact of a child's sex and the number of previous children on induced abortions, and find out the effects on some characteristics of women, such as gestation period, prior to an induced abortion. We found that induced abortions in China had their own characteristics, which were far different from other countries. The main difference was led by the fact that the country was driven by an implemented family planning program and nationwide population policies. The key cause of induced abortions was due to an inconsistency with the requirements of the family planning policy. However, as a result of effective and prevalent contraception, the rates of induced abortions are not quite as high as in the 1990s, when compared with other countries. Even though, in the early 1990s, the government had reinforced the family planning program through administration and legislation, unlike during the early 1980s when the one-child policy was implemented, the induced abortion rate, and the number of induce abortions, did not increase as the fertility rate substantially decreased. This finding implies that the fertility declines in the 1990s were not caused by the number of induced abortions. The transition of the fertility ideology of the people has played an important role in the fertility decline, as institutional reform and socioeconomic development are implemented.

Full Paper:

Induced Abortion in China in the 1990s

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Since 1991, a second decline in fertility rates has appeared in China[1] (Qiao 1996), marking the first time that fertility rates have reached a level under the replacement rate, about 2.1 for the total fertility rate (TFR). They are approaching the level that the national population policy expected, i.e., TFR of 1.6 (Qiao 1999). There are lots of implications with regard to the fertility decline. How could the fertility decline without an explicit "tightening-up" of national policy? Had the fertility decline been caused by a decrease in women's reproductive health? Did the reproductive health of women improve as fertility declined?

The objective of this paper is to estimate the overall number of induced abortions, calculate cohort induced abortion frequency, explore the impact of a child's sex and the

[1] Two declines in fertility rates have appeared in China since the family planning program began. The first decline occurred during the first phase of the family planning policies (Qiao and Suchindran 2001). The TFR dropped from 5.8 in 1970 to 2.24 in 1980. As a result of the impact of policy adjustment in the early 1980s, the fertility rate fluctuated in the 1980s, without a clear downward trend. TFR went up to 2.31 in 1990. Most scholars, as well as family planning officials, believed that it was impossible to have further declines in fertility at that time. However, a survey conducted by the State Family Planning Commission in 1992 found that the TFR was only 1.7 in 1992 (Zeng 1995) and the recent national surveys showed that the TFR, directly calculated from the surveys, was only 1.3-1.5 in the late 1990s (Guo 2000).

number of previous children on induced abortions, and find out the effects on some characteristics of women, such as gestation period, prior to an induced abortion.

Data Sources and Respondents Status

Having searched the previous published papers, both in Chinese and English, we found that almost all of the data used in academic articles dealing with induced abortion comes from the record of hospitals or small-scale surveys. It is very hard to obtain any nationwide data on induced abortions, especially any data combining induced abortions with other social characteristic variables. There is no way that one could know the overall situation of the people involved, or give plausible explanations to the reasons why induced abortions occurred in such a large country. In this paper, we are going to use the data from a national survey, known as the "National Population and Reproductive Health Survey." It was conducted by the State Family Planning Commission in November 1997. This data represents the first time we have been able to obtain the national data related to reproductive health, especially the data on induced abortions.

The survey is divided into two phases. The first phase targets the general status of the population, which covers 180,000 thousand people among 31 provincial areas. The second phase targets the childbearing women ages 15 to 49, who were randomly sampled from the population of the first phase. A total of 15,213 women were interviewed. The second phase took place in the middle of November 1997.

We are going to use the data from the second phase, since all the specific questions dealing with reproductive health were asked during it. The second phase survey is made up of eight parts: general status of women, health care during menstruation and overall health status, conception and giving birth, contraceptives, technical services, sexual diseases and AIDS, health care during menopause, and others. The information is very abundant and unique in terms of reproductive health in China.

In this paper, the data from the third part of this survey, conception and giving birth, is used. In this part, conception history (such as the order of conception), result of conception, gestation end date, parity of the birth, the number of months of breastfeeding for each live birth, and the current health of each live birth, is recorded, according to the order of conceptions. There are six possible results of conception: live male birth, live female birth, stillbirth, spontaneous abortion, induced abortion, and currently pregnant. There are corresponding gestation end dates for each result, excluding current pregnancies. Questions about the last induced abortion were asked separately in order to obtain the detailed characteristics of the abortion. These questions include the reasons for the last induced abortion, whether or not a B-ultrasonic test was taken prior to having the induced abortion, duration of gestation prior to the induced abortion, where the induced abortion was performed, how many days of rest were needed after the abortion, and how the induced abortion affected overall health.

Of all the respondents, 76.7 percent live in rural areas, 23.3 percent live in urban areas, with 90.7 percent coming from the Han ethnic background (majority), and 9.3 percent

from the minority. Compared with the 29.9 percent of the total population living in urban areas in 1997, according to the State Statistical Bureau (SSB, 1999), the sample proportion living in urban areas was a bit lower than that of the total proportion. Furthermore, the proportion of minority women was a bit of higher than the proportion seen in the 2000 population Census, which was 8.4 percent. Compared with the age structure of childbearing women in the 1990 population Census, we found that the proportion of women in the sample age structure age, who were less than 25 years old, was a little lower than the proportion for the total population, both in rural and urban areas (see Table 1).

Table 1. Age Structure of the Sample Women By Rural and Urban Areas

agg9711	Rural		Urban		Total	
	Case	Proportion	Case	Proportion	Case	Proportion
15-19	1284	11.00	336	9.48	1620	10.65
20-24	1498	12.84	446	12.58	1944	12.78
25-29	2253	19.31	628	17.72	2881	18.94
30-34	2184	18.72	592	16.70	2776	18.25
35-39	1316	11.28	524	14.78	1840	12.09
40-44	1652	14.16	571	16.11	2223	14.61
45-49	1481	12.69	448	12.64	1929	12.68
Total	11668	100	3545	100	15213	100

In order to understand reproductive behavior, one should know the general health status and situation of the women in a sample, and how they differ in rural and urban areas. In rural areas, 26.8 percent of women age 15-49 were illiterate, compared to 3.6 percent in

urban areas. In rural areas, 6.1 percent of women received an education higher than the high school level, compared to 51.1 percent in urban areas. This data tells us that the education level of childbearing women in rural areas was much lower than the educational level of women in urban areas, which led to different ideas and behaviors with regards to family planning, reproductive health, and induced abortion.

Table 2. Educational Status of Respondent Women By Rural and Urban Areas

Areas		Illiterate	Primary School	Junior Middle School	High School	Technical School	College	Total
Rural	Case	3121	4207	3624	556	139	21	11668
	Proportion	26.75	36.06	31.06	4.77	1.19	0.18	100
Urban	Case	128	339	1268	878	400	532	3545
	Proportion	3.61	9.56	35.77	24.77	11.28	15.01	100
Total	Case	3249	4546	4892	1434	539	553	15213
	Proportion	21.36	29.88	32.16	9.43	3.54	3.64	100

Of the women in the survey, 17.7 percent were unmarried, while 78.7 percent were in a first marriage (see Table 3). Other categories, such as remarried, divorced, and widowed, accounted for only a small proportion of the total number of women. Compared with urban areas, less women in rural areas were unmarried, a higher percentage were in a first marriage or were remarried, and a lower percentage were divorced.

Table 3. Marital Status By Rural and Urban Areas

Areas		Unmarried	First marriage	Remarried	Divorced	Widowed	Total
Rural	Case	1954	9344	266	25	79	11668
	Proportion	16.75	80.08	2.28	0.21	0.68	100
Urban	Case	741	2633	62	84	25	3545
	Proportion	20.9	74.27	1.75	2.37	0.71	100
Total	Case	2695	11977	328	109	104	15213
	Proportion	17.72	78.73	2.16	0.72	0.68	100

Estimating of the Number of Induced Abortions

We estimated the rates and the ratios of induced abortions using the 1997 survey data without any adjustment (Qiao and Suchindran 2001). Now, we must estimate the total number of induced abortions that occurred from 1990 to 1997. However, we found that it was inappropriate to represent the national level using the directly estimated ratios, and the number of induced abortions, if we did not make any adjustments to the data because of problems of questionnaire design, unequal population size in urban and rural areas, and the underreporting of births.

The general approach to estimating the total number of induced abortions is to calculate the ratio of these abortions, which is the number of induced abortions occurring in a year divided by the number of live births occurring in the same year in the sample population. Then, we calculate the number of induced abortions, multiplying the ratio by the total number of nationwide births in relevant years published by the State Statistical Bureau. In each step, we have to make an adjustment based on appropriate assumptions.

Among all the 15,213 respondents, there were 12,518 married women who responded to the third part of the questionnaire, conception and giving birth. The 2,695 unmarried women skipped over these questions based on the questionnaire's instructions. These instructions may have led to a little bit of unbiased estimation, because unmarried conception, induced abortions, and live births were excluded from the survey. Because the proportion of unmarried conception was relatively small, it was possible to assume that the ratio of induced abortions to live births for unmarried pregnant women was the same as the ratio for married pregnant women.

In order to estimate the overall number of induced abortion from 1990 to 1997, some items should be taken into account:

1. Because this survey only covered women age 15-49 (at the time of the survey - around the middle of November), some information would be truncated if we directly calculated the number of induced abortions and the number of live births by women of the same age from previous years. For example, the induced abortions occurring in 1990 were only performed on women under the age of 42, based on the survey data.
2. The proportion of the survey population in rural and urban areas should be adjusted based on the corresponding proportion of the national population, because the sample and total proportions in rural and urban populations are different. Furthermore, the ratios of induced abortions between rural and urban areas were quite different. The adjusted weight by post-stratification differed in each previous year as well.

3. Due to questionnaire restrictions, all of the pregnant women were married. All the induced abortions and live births were performed by married women. We are unable to estimate the unmarried births and unmarried induced abortion from the original data set.
4. The underreporting of births, which frequently occurred in China in the 1990s, was still represented in this survey. Calculated based on the original data, we found that the TFR was only 1.57 in 1992, and 1.35 in 1994. In fact, the estimated levels (TFR) corresponded to the crude birth rates published by the State Statistical Bureau, which were 2.0 in 1992, and 1.9 in 1994 (Qiao 1999).

The ratios of induced abortions shown in columns 2, 3, and 4 in Table 4 were calculated directly from the raw data, which we assumed was not influenced by truncation. The proportion of rural and urban populations was correct (23.3 percent of the population in urban areas), the ratio of unmarried induced abortion was the same as the ratio of married induced abortions, and the underreporting of the induced abortions was the same as the underreporting of live births (Qiao and Suchindran 2001).

By removing truncation assumptions by multiplying the yearly truncation adjusted indexes in rural and urban areas, which was the proportion of induced abortions and live births in truncated women[2], we obtained the ratios, listed in column 5 and 6 in table 4. Because the proportion of the urban population in the survey data (23.3 percent) was

[2] We calculated the age distribution of induced abortions and live births occurring in 1995, 1996, and 1997 among respondents. The cumulative proportion from the higher age group was referred to as the truncation index at a given age. Because truncated ages for adjustment were only available from age 42 to 49, the influence of these ages on induced abortions and live births was very small.

lower than the published national proportion (29.9 percent in 1997, and 26.4 percent in 1990), the overall yearly ratios of induced abortions had to be weighted by the real population proportion. The adjusted results are given in column 7, which were a bit of higher than the unadjusted ratios.

Table 4. Estimate of the Ratio of Induced Abortion, 1990-1997

	non adjusted ratio			Adjusted ratio by truncation parameter		Adjusted overall ratio by rural and urban proportion (7)
Age (1)	Rural (2)	Urban (3)	Total (4)	Rural (5)	Urban (6)	
1990	21.04	74.56	28.67	21.03	74.44	29.79
1991	27.61	83.06	34.93	27.54	82.96	35.95
1992	28.89	100.85	38.93	28.83	100.76	40.98
1993	33.91	94.21	42.87	33.88	94.16	44.94
1994	36.42	82.14	43.69	36.35	82.12	45.46
1995	37.96	115.00	49.00	37.95	115.00	52.09
1996	32.00	73.53	38.26	31.94	73.53	40.07
1997	32.16	64.29	37.86	32.09	64.29	39.56

These results were calculated under the assumption that the ratios of induced abortions for unmarried women were the same as those for married women, and the extent of underreporting was equal to the number of induced abortions and live births (Estimate 1 in Table 6). It might be possible to keep the former assumption, but it is impossible to hold the latter assumption. In fact, the underreporting of live births for married women was quite higher than the underreporting of induced abortions. The reason for this discrepancy was that the number of children in a family was restricted by the family planning policy. Both of the parents of non-approved children, and the personnel who

were in charge of these parents from the grassroots level, attempted to conceal the results, for fear that charges could be brought against them. The TFR, directly calculated from the survey data, was 1.57 in 1992, and 1.35 in 1997 (see Table 5). The corresponding results, estimated based on the published birth rates by the State Statistical Bureau, were 2.00 in 1992, and 1.82 in 1997 (Qiao, 1999). The relative differences between the two estimations were from 20 to 30 percent. Adjusting the underreporting of the live births, we obtained new ratios of induced abortions (Estimate 2 in Table 6) by assuming that the number of induced abortions in the survey was correct.

Table 5 The Difference of TFR Between the 1997 Survey and Estimated Results From Published National Data.

Year	TFR	TFR	Relative difference
1990	2.354	2.31	1.019
1991	1.746	2.16	0.808
1992	1.567	2.00	0.784
1993	1.546	1.98	0.781
1994	1.350	1.94	0.696
1995	1.362	1.87	0.728
1996	1.377	1.86	0.740
1997	1.345	1.82	0.739

Table 6. Estimate of the Number of Induced Abortions

age	Estimate 1	Estimate 2	Estimate 3	Number of Births (Thousands)	Number of Induced Abortions (Thousands)
1990	29.79	30.35	30.18	23907	7215
1991	35.95	29.06	30.83	22647	6983
1992	40.98	32.11	34.34	21249	7297
1993	44.94	35.09	37.56	21318	8007
1994	45.46	31.63	34.81	21095	7343
1995	52.09	37.94	41.31	20627	8521
1996	40.07	29.66	32.17	20674	6651
1997	39.56	29.24	31.72	20382	6466

We do know that the induced abortions also contributed to the underreporting in the survey, even though the amount of underreporting was lower than with live births. We assumed that induced abortions had an underreporting rate of 30 percent, relative to the underreporting of live births. Finally, the third estimation of the ratio of induced abortions was obtained on Table 6. By multiplying the ratios of induced abortions by the overall number of live births estimated from the published national data (SSB, 1999), we calculated the total number of induced abortions from 1990 to 1997 (Table 6).

Karen Hardee-Cleaveland and Judith Banister (1988) had estimated the number of induced abortions that occurred from 1971 to 1986. Before 1979, the number of induced abortions was less than 5.4 million each year. Beginning in 1979, the number of induced abortion quickly increased. The highest number appeared in 1983, when 14 million induced abortions took place, and then declined to 8.9 million in 1984, and 11.6 million in 1986. Based on the birth data published by the State Statistical Bureau, the ratio of

induced abortions was 41.56 percent in 1981, 69.11 percent in 1983, 42.81 percent in 1984, and 48.02 percent in 1986 (Qiao 2001). We gathered that the ratios of induced abortions would be decreasing during the late 1980s. Entering the 1990s, the ratios of induced abortions again increased gradually (based on the third estimate) from 30.18 percent in 1990 to 41.31 percent in 1995, and then decreased again. The number of induced abortions was around 7 million, except in the years 1993 and 1995, during which the number surpassed 8 million.

Cumulative Induced Abortion Rate

Cumulative induced abortion rate is defined as the average time of an induced abortion for a woman up to an exact age. We directly calculated this index by summing up all the time of induced abortions among a cohort age group up to an exact age, and then divided this result by the number of women in the cohort. The completed cumulative induced abortion rates at the exact age of 45, among the women aged 45-49 in late 1997, were 1.16 for rural areas, and 2.06 for urban areas. The unadjusted overall rate was 1.37. This result tells us that, in rural areas, there is, on average, over one induced abortion per women in her life, and two per woman in urban areas. Cumulative induced abortions by the exact age of 40 can also be recognized as a completed rate, because conception occurring after age 40 is rare. The results show that cumulative induced abortions by age 40 were different between age 40-44 and 45-49. Also, the differences are larger in urban areas than in rural areas.

Table 7. Cumulative Induced Abortion Rate By Rural and Urban Areas

age group	Exact age					
	<20	<25	<30	<35	<40	<45
Rural areas:						
20-24	0.0561					
25-29	0.0755	0.5193				
30-34	0.0668	0.5893	0.8956			
35-39	0.0433	0.5403	0.9552	1.0684		
40-44	0.0539	0.4788	0.9625	1.1477	1.1949	
45-49	0.0831	0.4821	0.8987	1.0898	1.1533	1.1648
Urban areas:						
20-24	0.0179					
25-29	0.0430	0.6067				
30-34	0.0389	0.7348	1.3125			
35-39	0.0324	0.6031	1.3607	1.5649		
40-44	0.0263	0.3905	1.3135	1.6042	1.6830	
45-49	0.0536	0.5871	1.5402	1.9442	2.0201	2.0603
Total						
20-24	0.0473					
25-29	0.0683	0.5383				
30-34	0.0608	0.6203	0.9845			
35-39	0.0402	0.5581	1.0706	1.2097		
40-44	0.0467	0.4561	1.0526	1.2649	1.3202	
45-49	0.0762	0.5064	1.0476	1.2882	1.3545	1.3727

Looking at the whole process of induced abortions among the cohort group ages 45 to 49, we found that the high frequency of induced abortions occurred between the ages of 20 and 30 in rural areas, and between the ages of 20 and 35 in urban areas. The highest frequency of induced abortions was found between the ages of 25 and 30 in urban areas, where, on average, almost one induced abortion per woman occurred. Apparently, the change in the number of induced abortions was more drastic in urban areas than in rural areas. Even though the active periods of induced abortions have a strong relation to a

woman's age, the impact of family planning policies could not be neglected. It is clear that the one-child policy, implemented in the early 1980s, had a positive impact on the increase in the frequency of induced abortions occurring between the ages of 25 and 30 (for cohort women age 40-44 and 45-49 at survey time), especially in urban areas where the one-child policy was still being enforced.

Studying the induced abortion rates in different cohorts, we found that there was no clear tendency for the younger generations to have higher induced abortion rates, compared to that of the older generations in both rural and urban areas. This information shows that the change of ideology and willingness to have induced abortions are not more significant than other effects following the economic reform and opening of China.

A prominent difference existed between rural and urban areas. The cumulated induced abortion rates at the exact age of 20 were higher in rural areas than in urban areas, though the overall levels were very low. These tendencies changed at the exact age of 25, where the cumulated induced abortion rates were a little higher in urban areas. From age 25 to 30, the incidence of induced abortions in urban areas was much higher than that in rural areas. A rational explanation for the rate difference between rural and urban areas is that there were more strict family planning policies, and a lower prevalence of highly valid contraceptive methods, for the people in urban areas (Qiao and Suchindran 2001).

Impact of the Sex of Previous Children

Many descriptive studies have proven that sex ratios at birth in China have been very high since 1980, the year that the one-child policy was started. The statistical results of the sex ratio at birth were even worse during the 1990s (Jia and Sai 1995). The focus of discussion on the issue revolved around the main causes of the high sex ratio at birth (Aird 1990; Hull 1990; Johanson and Nygren 1991; Qiao 1992; Coale and Banister 1994). Terence Hull (1991) had summarized three potential causes: infanticide (the traditional method of disposing of unwanted babies in feudal China), abortions carried out after parents gained access to technologies to determine the gender of the fetus, and the result of faulty statistical reporting. Research carried out by Yi Zheng and his colleagues had proven that "the sex-differential underreporting (reported female was less than male) of births is the most important cause of the high reported sex ratio at birth in China" (Zeng 1993). Even though the Chinese government attempted to prohibit pregnant women from having an examination to determine a fetus' sex, which is carried out by some doctors and hospitals, these examinations and sex-based induced abortions have increased in recent years, because of the strong desire to have at least one son. However, due to the absence of research in terms of sex-based induced abortions, it was almost impossible to determine the effect of the inducted abortions on the high sex ratio at birth.

We know that induced abortions, to some extent, were effected by the number of children restrictions required by the family planning policy, and the implementation of local family planning (Qiao and Suchindran 2001). Whether or not to have an induced abortion after conception was also determined by parents based on the number and the sex of their

previous children. The desire to have a son is still strong in Chinese society. Under the number of children restrictions, the desire to select the sex of children is stronger than the desire to determine the total number of children.

Table 8 lists the frequency and the proportion of induce abortions, based on the number and sex of prior children calculated from the data in the 1997 national reproductive health survey. For parents whose first child was a son, 27.45 percent of pregnant women had induced abortions. For parents whose first child was a daughter, 23.14 percent had induced abortions, less than the proportion of induced abortions among women whose first child was a son. Looking at the proportion of abortions among pregnant women who previously had two children, we found that the proportion of induced abortions among women who already had two daughters was only 12.5 percent, less than the proportion of induced abortions among pregnant women who had had one son and one daughter, 22.74 percent, and much less than the proportion of induced abortions among pregnant women who had had two sons before their current conception, 27.26 percent.

Table 8. Frequency and Proportion of Induced Abortions Conditional to the Number and Sex of Prior Children

Prior number and sex of children		Induced abortion	Non induced abortion	All conception	Proportion of induced abortion
One child	One son	975	2577	3552	0.2745
	One daughter	829	2754	3583	0.2314
Two children	Two sons	172	459	631	0.2726
	One son and one daughter	317	1077	1394	0.2274
	Two daughters	112	784	896	0.1250

We used logistic regression models to determine the effect of the sex of prior children on induced abortions. For the effect of the sex of the first child, we used the following function:

$$\text{Log}\left(\frac{P}{1-P}\right) = \alpha + \beta X$$

Where P represents the proportion of induced abortions among pregnant women, and X represents the sex of the last child. X is a dummy variable, with X=1 when the prior child is a son, and X=0 when the prior child is a daughter.

For modeling the effect of the sex of the first two children, we used the following function:

$$\text{Log}\left(\frac{P}{1-P}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2$$

Where X_1 and X_2 are dummy variables, with $X_1 = 1$ when the prior children are both sons, and $X_2 = 1$ when the prior children consist of one son and one daughter. Otherwise, the variable was set to, $X_1 = X_2 = 0$ when both children were daughters.

The results of the regression are given in Table 9. The reference parameters are one daughter for function 1 and two daughters for function 2. All the parameter estimates are

highly statistically significant. The odds ratio for function 1 is 1.257, which represents the increment of induced abortions for the pregnant women whose first child was a son, compared with the induced abortion rate among the pregnant women whose first child was a daughter. The odds ratio is 2.623 for two sons, and 2.06 for one son and one daughter for function 2, which means that the level of induced abortions doubled for the pregnant women who had at least one son, compared with the women who had no sons before their current pregnancy. In short, induced abortions were unlikely to be performed by pregnant women if they had no sons before the current conception, and was likely to be performed if they already had at least one son. This regression shows that the number of and sex of prior children among the pregnant women had a strong impact on the choice to have an induced abortion.

Table 9 The Result of Regression

	Parameter	Parameter estimate	Standard Error	Wald chi-square	P- value	Odds Ratio
Function 1	Intercept	-1.2006	0.0396	918.4578	<0.0001	
	β	0.2286	0.0546	17.5251	<0.0001	1.257
Function 2	Intercept	-1.9459	0.101	371.083	<0.0001	
	β_1	0.7229	0.1195	36.5745	<0.0001	2.060
	β_2	0.9643	0.1349	51.1067	<0.0001	2.623

Duration of Gestation Before Undergoing Induced Abortion

The question, "How many months had you carried before undergoing the last induced abortion"? was asked[3] in the 1997 National Population and Reproductive Survey. Because gestation duration for pregnant women, before having an induced abortion, is always associated with a woman's desire to have more children, under the context of the implementation of family planning, it is natural that we consider the impact of the reasons induced abortions are performed: the B-ultrasonic wave test, age, and the social characteristics on the duration of gestation.

Since the number of months of gestation was censored at the fourth month in the data set, when women with four months gestation and over (including the four month) were cumulated, only four categories were formed. Table 10 gives the distribution of gestation duration among relevant factors, such as the reasons for undergoing the last induced abortion, conducting the B-ultrasonic wave test, ethnic background, age, and educational status.

[3] We noticed that the estimate of the gestation duration might exist, to some extent, because of a bias in representing the general situation. The survey only asked for the gestation duration of the last induced abortion, rather than all the time of the induced abortion. The results generated from this data were not accurate.

Table 10. Description of Duration of Gestation By Related Variables

		Number of induced abortion by months of gestation				Proportion of induced abortion by months of gestation			
		1	2	3	4 +	1	2	3	4+
Reasons for undergoing last induced abortion	Unexpected Pregnancy	512	778	113	209	31.76	48.26	7.01	12.97
	In Case of Affecting the Health of Child	22	57	18	28	17.60	45.60	14.40	22.40
	In Case of Affecting the Health of Her Own	26	31	9	14	32.50	38.75	11.25	17.50
	In Case of Affecting Work and Living	111	241	52	60	23.92	51.94	11.21	12.93
	Inconsistency With the Requirement of Family Planning	315	599	122	423	21.59	41.06	8.36	28.99
	Other Reasons	87	142	23	52	28.62	46.71	7.57	17.11
Conducted B-ultrasonic wave before undergoing induced abortion	Yes	154	204	41	141	28.52	37.78	7.59	26.11
	No	919	1644	296	645	26.23	46.92	8.45	18.41
Ethnic background	Han	1026	1715	306	692	27.44	45.87	8.18	18.51
	minority	47	133	31	94	15.41	43.61	10.16	30.82
Educational status	Illiterate	99	268	74	234	14.67	39.70	10.96	34.67
	Primary school	202	525	108	310	17.64	45.85	9.43	27.07
	Middle school	398	643	107	191	29.72	48.02	7.99	14.26
	High school	197	254	29	39	37.96	48.94	5.59	7.51
	Professional school	87	61	6	6	54.37	38.13	3.75	3.75
	College and over	90	97	13	6	43.69	47.09	6.31	2.91
Age	<30	224	424	69	179	25.00	47.32	7.70	19.98
	30-39	468	769	125	315	27.91	45.86	7.45	18.78
	>39	381	655	143	292	25.90	44.53	9.72	19.85
	Total	1073	1848	337	786	26.53	45.70	8.33	19.44

Intuitively, women who had induced abortions, because of an unexpected pregnancy, underwent induced abortion earlier. On the contrary, women who had induced abortions because of an inconsistency with the requirement of family planning had a later abortion. The data supported these assumptions. Eighty percent of pregnant women, whose abortion was driven by an unexpected pregnancy, had an induced abortion during the first two months following conception. Only 13 percent of pregnant women had induced abortions fourth months following conception and beyond. In comparison with the proportion of induced abortions due to an unexpected pregnancy, we found that the proportion of abortions after four months gestation, due to the inconsistency with the requirements of family planning, was 29 percent. We also found that the proportion of induced abortions after four months of gestation was higher for the pregnant women who had taken the B-ultrasonic wave test prior to the abortion (26.1 percent), when compared with the women who had not taken the B-ultrasonic wave test(18.4 percent). It was also true that the proportion was higher for the pregnant women of the minority (30.8 percent) as opposed to the women who were in the Han ethnic majority (18.5 percent). The impact of educational status on the gestation duration prior to an induced abortion was more distinct. The less educated the woman, the longer the gestation duration before having an induced abortion. The women with a higher education had a tendency to have an induced abortion earlier, and also had fewer children than the less educated women. However, no clear differences existed between the duration proportions for induced abortions among different ages.

In order to further explain the impact of these variables on the length of time prior to an

induced abortion, we used Cox regression to construct a proportional hazard model:

$$\frac{h_i(t)}{h_j(t)} = \exp\left\{\sum_k \beta_k (x_{ik} - x_{jk})\right\}$$

Where $h_i(t)$ represents the hazard of an induced abortion for individual i at the duration t; h_j represents the baseline hazard of an induced abortion with relevant reference for categorical variables[4], unexpected pregnancy, taking the B-ultrasonic wave test before, belonging to the Han ethnic majority, and education status, and without changing the continuous variable, age. X_{ik} represents the k th explanatory variable (k=1 to 13) for individual i. β_k is the regression coefficient for the k th explanatory variable.

Table 11 shows the results of the regression. A higher hazard of induced abortions means that the abortion had a tendency to be performed at an early time, which is a desired consequence. On the contrary, a lower hazard of induced abortions means that induced abortions were performed during later months, which is not desirable. The hazard ratio in the results of the Cox regression reflects the relative hazard of induced abortions of the given variable (the variable =1) to the baseline variable (the variable =0).

For example, the hazard for women who had induced abortions because the health of a child was at risk was only 72.2 percent of the hazard for women who had induced

[4] We recoded the categorical variables, reasons of undergoing last induced abortion, conducted B-ultrasonic wave before undergoing induced abortion, ethnic background, and educational status into dummy variables with reference to an unexpected pregnancy, taking the B-ultrasonic wave, belonging to the Han ethnic majority, and illiterate, and setting it equal to zero. Otherwise, the variable was equal to 1.

abortions because of an unexpected pregnancy, controlling other variables. This difference occurred because the estimate was statistically significant. The hazard ratio's other three causes, a pregnancy that is detrimental to the woman's health, effects her ability to work and standard of living, and other reasons, were not significant. A striking result is that the hazard ratio of induced abortions for the pregnant women, who had an induced abortion because of an inconsistency with the requirements of family planning, was 76.3 percent of the hazard for those who had an induced abortion due to an unexpected pregnancy. The reason for having an abortion clearly impacts when, during the gestation period, the abortion is performed. It is clear that the women who had induced abortions because of an unexpected pregnancy tend to have the abortion much earlier, as opposed to women who had abortions because of an inconsistency with the requirements of family planning.

Table 11. The Result of Cox Regression

Variables	Hazard Ratio	Standard. Error	z- value	P - value	95% Confident Interval	
					Lower	Higher
In Case of Effecting the Health of Child	0.722	0.077	-3.07	0.0020	0.587	0.889
In Case of Effecting the Health of Her Own	1.060	0.134	0.46	0.6440	0.827	1.359
In Case of Effecting Work and Living	0.972	0.055	-0.50	0.6140	0.869	1.086
Inconsistency With the Requirement of Family Planning	0.763	0.032	-6.44	0.0000	0.703	0.829
Other Reasons	0.892	0.061	-1.67	0.0960	0.780	1.020
Without B-ultrasonic wave	1.154	0.063	2.63	0.0090	1.037	1.285
Minority	0.788	0.056	-3.33	0.0010	0.685	0.907

Primary school	1.163	0.070	2.51	0.0120	1.034	1.307
Middle school	1.586	0.092	7.93	0.0000	1.415	1.777
High school	1.857	0.126	9.16	0.0000	1.627	2.121
Professional school	2.302	0.218	8.80	0.0000	1.912	2.772
College and over	2.091	0.182	8.49	0.0000	1.764	2.479
Age	1.001	0.003	0.24	0.8080	0.996	1.006

In most rural areas, the family planning policy allows women, whose first child is a girl, to have a second child. Almost all of the women who had a girl first expect their second child to be a boy, due to the strong desire to have a son in Chinese society. However, because it is their last chance to have a boy, some people in rural areas want to know the sex of the fetus prior to delivery. The most efficient and effective way to identify the sex of a fetus is with the B-ultrasonic wave test. Some research has found that sex-based induced abortions following prenatal sex determination do exist in China (Zeng, 1993). Even though being examined using the B-ultrasonic wave test is a normal procedure for pregnant women, the regression results showed that women who undertook the B-ultrasonic wave test, before having an induced abortion, were influenced based on the results of the test. The hazard of induced abortions, for those who did not take the B-ultrasonic wave test during gestation, is 15.4 percent higher than the hazard of induced abortions for women who took the B-ultrasonic wave test. The regression results also showed that minority women had a lower hazard of induced abortions compared to the women of the Han majority.

Cox regression also demonstrated that the educational status of women impacted the hazard of induced abortions. The general trend is that the higher the educational level of

the women, the higher the hazard for induced abortions, with an exception of a college education and above. This result shows that the women with a lower education tend to undergo induced abortions at later months, and the women with a higher education attempt to have induced abortions early in their pregnancy. This result was also affected by the number of children desired. Women with a lower education usually intend to have more children, while women with a higher education prefer to have only one child.

We found that the hazard for induced abortions among age groups did not differ, because the results of the hazard ratio were not statistically significant.

Conclusion

Induced abortions in China have their own characteristics, which are far different from other countries. The main difference comes from the fact that the country is driven by an implemented family planning program and nationwide population policies. One of the characteristics is that the proportion of induced abortions occurring in non-married women is very small. In married couples, a large cause of induced abortions is an inconsistency with the requirements of the family planning policy. However, as a result of effective and prevalent contraception, the rates of induced abortions are not quite as high in the 1990s, when compared with other countries (Qiao and Suchindran 2001). Even though, in the early 1990s, the government had reinforced the family planning program through administration and legislation, unlike during the early 1980s when the one-child policy was implemented, the induced abortion rate, and the number of induce

abortions, did not increase as the fertility rate substantially decreased. This finding implies that the fertility declines in the 1990s were not caused by the number of induced abortions. The transition of the fertility ideology of the people has played an important role in the fertility decline, as institutional reform and socioeconomic development are implemented.

From the previous analysis, we found that the incentive for women that led to induced abortions is not to obtain a certain number of children, but to control the sex of the child, mainly to have a son. By taking advantage of prenatal examinations, some women make their own decisions as to whether or not to have an induced abortion once they know the sex of the fetus, instead of having family planning personnel enforce the laws. Therefore, a large number of induced abortions are decided and driven by the pregnant women themselves, unlike the situation that occurred at the early 1980s, when most induced abortions were due to the government enforcement of family planning programs.

Family planning in China has changed since 1990, which has led to changes in the numbers and causes of induced abortions. Our attention should not be focused on only the number or the rate of induced abortions, but also on the health problems caused by these abortions. China is a heavily populated country, and most people are living in undeveloped, rural areas. Induced abortions occurring in developed areas and undeveloped areas have distinct differences and implications. Unfortunately, we know almost nothing about these implications and conduct little research in this area.

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