1992 National Fertility and Family Planning Survey, China

Selected Research Papers in English

The State Family Planning Commission, Beijing, China

The World Health Organization Collaborating Center in Perinatal Care and Health Services Research in Maternal and Child Health, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

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PREFACE

In October 1992, the State Family Planning Commission (SFPC) of China conducted a National Fertility and Family Planning Survey. The sample size was 380,000 persons, including 73,946 ever married women aged 50 and below. The sample units were selected to be representative of China and all individual provinces as well. Based on the survey results on fertility, contraceptive use, and population structure, SFPC has edited and published three Chinese language books with tables, charts and analytical papers.

In order that foreign readers can know more about changes in China's population and demography in recent years and to share this information with demographers of other countries, the World Health Organization Collaborating Center in Perinatal Care and Health Services Research in Maternal and Child Health, Centers for Disease Control and Prevention (CDC) and SFPC, has jointly edited this English language monograph to introduce the main findings of the survey.

I hope the monograph will lead to the better understanding on China's demographic situation by the international community. The publication is also a special contribution to the 23rd General Conference of IUSSP, 1997, in Beijing, China.

I would like to express my sincere thanks to all of our staff members who did so much to make this publication possible.

Jiang, Zhenghua, Vice Minister,
State Family Planning Commission of China

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INTRODUCTION

Chen Shengli and Wang Qian

Objectives of Survey

The State Family Planning Commission (SFPC) of China has conducted three national sample surveys of fertility and family planning in 1982, 1988 and 1992. Conducted in September 1992, the third survey interviewed a sample of 380,000 residents representatives of the whole country. The main objectives of the survey were to document the current fertility levels and contraceptive practice, to evaluate the performance of the national family planning program, and to obtain data to help plan and provide better family planning services to couples of reproductive age in China.

Sampling Methodology

The sampling plan was designed by the Department of Planning and Statistics of the SFPC, using a two-stage stratified cluster sampling design. In the first stage of sampling, about 2,300 counties for the entire nation were first stratified by province ordered by their crude birth rate in 1991; then, a total of 561 sample counties were systematically selected, province by province, regardless of the size of the county. In the second stage, 2,301 sample units (or clusters) were also systematically selected from residential units of all selected sample counties regardless of the size of the residential units. However, the number of residential units selected reflect the size of the county.

The residential unit is the basic area unit of the administrative set-up, which is officially named " resident team" in urban areas and "village team" in rural areas. All households in 2,300 sample residential units (or clusters) were visited by interviewers after the exclusion of 1 sample residential unit in the plateau nomadic areas of Qinghai Province without any residents. The 1992 survey was designed to collect information from the individual, especially ever married women aged 15-49 years, living in the sample household. However, all residents of the sample resident units were actually interviewed except that the head of household was used as proxy for household members under 15 years of age.

Based on the sampling design, the standard error of the crude birth rate for the whole country was 0.7 per thousand and was lower than 2 per thousand for the majority of provinces. The survey results have relatively good precision for the whole country and most provinces. (See Appendix B of this monograph for detailed information on the estimation and analysis of sampling errors for this survey).

Survey Organization and Field Work Training

The SFPC set up a special working group for the 1992 survey; the head of this working group was Mrs. Peng Pieyun, State Councilor and the Minister of the SFPC. The members of the special working group included the directors of the functional and supporting departments of the SFPC. The Department of Planning and Statistics of the SFPC was responsible for all aspects of the survey, which included questionnaire design, recruiting and training supervisors and interviewers, fieldwork supervision, data management, and reporting survey results.

The statistics branch and statisticians in the FP commissions at the province level, the prefecture level and the county level took part in this survey. There were 591 supervisors selected from the 30 Provincial Family Planning Commissions and the FP commissions of the 561 selected counties. Most of them took part in the previous 1988 survey. We trained almost 4000 interviewers, of whom more than half were female, from FP agencies at the township level. All supervisors were trained directly by the staff of the Department of Planning and Statistics of the SFPC in three regional training workshops for 5 days each. In each province, the trained supervisors, in turn, trained the interviewers for 5 days. The training workshops included detailed explanation and discussion of the contents of questionnaires, interviewing techniques, and rules and regulations of fieldwork. After training, only those who passed the examination were allowed to be interviewers.

Field Work Procedures

The home visits were made by a pair of male and female interviewers. Only the female interviewer entered the house to conduct interviews. To facilitate the fieldwork, the male interviewer was engaged in enumeration and making appointments with households to be interviewed. Prior to the survey, community/village leaders and the sample households were officially informed and reassured by the State Commission on Family Planning that the information obtained from the survey would be kept confidential. During home visiting, the respondents were again reassured that the interview contents would be kept confidential by the interviewer. Immediately after the completion of interview, the questionnaire form was reviewed by a supervisor for it's completeness. The completed questionnaires were directly mailed to the Department of Planning & Statistics of SFPC for processing.

In order to assess the quality of the survey, after the completion of fieldwork, 60 sample area units were randomly selected for re-interview. All contents of the interviews were checked against the original interviews by the Department of Planning & Statistics. The results showed that 97% of the contents of questionnaires from both surveys were consistent.

Content of Questionnaires

The survey questionnaire included two parts: The first part collected information on the household and the second part collected socio-demographic data of individual household members and the reproductive status and contraceptive practice for every married women of reproductive age.

The main item on the first part included:

a. Geographical location, kinds of drinking water and energy used in the household.
b. Distance to the capital, public transportation, high school, health and family planning services, and topography of the sample unit.
c. Income levels and family planning performance of the village and township.

The second part included:

a. Sex, year and month of birth, number of siblings, education and status of residence and household registration or each household member.
b. Year and month of first marriage, numbers of live births and living children, birth and death records for last 4 live births, sex of last birth, contraceptive method currently used, reasons for not using contraception, and acceptance of family planning services in the past year, for every married women aged 15-49.

De-facto and De-jure Residents

The 1992 survey was designed to collect national information on demographic characteristics of individual residents, and fertility and contraceptive status for ever married women 15 to 49 years of age, in the households that were chosen in the area probability sample. The survey enumerated de-facto residents, and also traced the de-jure household members who have either temporarily or permanently moved out from the household in the sample areas. The de-facto residents are simply defined as residents who were currently residing in households whether or not they were registered in the local office household registry; de-jure residents are those who are registered in the official registry, whether currently residing there or not.

The survey data provided the proportion of de-facto residents who were de-jure residents by geographical regions, rural-urban areas, and province for different demographic groups. These proportions are indicative of the usefulness of the household registry as a roster for conducting surveys. In local area where such a proportion is very high, the household registry can be conveniently and efficiently used. However, the lower the proportion in an area, the household registry is less useful as representative of current residents. Appendix A of this monograph presents the proportion of de-facto residents who were de-jure residents by geographical regions, rural-urban areas, and province for different demographic groups.

Data Processing and Analysis

The data entry and edit procedures (after double data entry) was done by the Department of Planning & Statistics, SFPC. Mistakes in data were corrected depending on the situation: some data were revised by the interviewers who were asked by telephone to go back to the sampling units to check the data or re-interview; some data were revised after the logical consistency checks. The consistency of data was relatively good.

The Department of Planning and Statistics processed more than 1,000 tables within three months after the field work was completed. SPSS and other software packages were used in data processing. All of the tables were provided to the relevant persons for analysis and research. Meanwhile, the SFPC sent the data diskettes to several institutes, including the Population Research Institute of the People's University, the Institute of Population Research of Beijing University, the 710 Institute, the Institute of Population Research of Beijing Economic college, the Department of Epidemic Disease of Beijing Medical University, the Research Center of the Aged Population, the Population Institute of the Chinese Academy of Society and the Systems Institute of the Chinese Academy of Sciences. The scholars from these institutes and some researchers of SFPC have finished about 40 papers. Up to now, three books (separately the data, the chart and the papers) have been published. In depth analysis, especially joint research with scholars abroad, is an ongoing process.

Brief Summary of Main Results

1. Population composition

The total sample size was 385,192, including 196,395 males and 188,797 females. The sex ratio of the sample population was 104.0, compared with 106.4 from the Fourth Census in 1990. The proportion of children aged 14 or lower was 27.1%; the proportion of the population age 65 and over was 5.7%; the median age increased from 27.1 in 1982 (from the Third Census) to 28.7. The Population of China has become as an adult one.

2. Marriage

The number of women at first marriage topped the ten million mark in 1980. The mean age at first marriage was 22.6 in 1980, then it declined to about 21.6 in the middle 1980's rising once again to 22.6 in 1992. This compares with about 24 years of age for women in developed countries.

3. Fertility

The total fertility rate (TFR) had declined by about one child, from 2.86 in 1982 to 1.87 in 1991 and 1.72 in 1992; however the curve of the TFR decline does not appear to be a straight line as the TFR rebounded to 2.61 in 1987. There was an obvious fertility difference between the urban population and the rural population, namely 1.23 versus 2.03. In 1992, the TFR at first parity was

0.929, the TFR at second parity was 0.441, and the TFR for third and higher parities was 0.172. The relevant data in 1986 were 1.159, 0.858, and 0.555 respectively. The proportion of first parity births in 1992 was 63.1%, the proportion of second births was 27.3% and the proportion of third and higher parity births was 9.6%. The relevant data in 1986 were 50.7%, 31.4%, and 17.9%, respectively. At the time of the survey, the proportion of women who had no child was 8.0%, the proportion of women with one child was 32.7%, the proportion of women with two children was 31.9% and the proportion of women with three or more children was 27.4%. The mean number of children for each married woman was 1.9.

4. Contraceptive prevalence

The contraceptive prevalence rate for married child-bearing women was quite high in 1992, reaching 83.4%. The prevalence for urban women was very close to that of rural women, namely 83.8% versus 83.3%. The proportion of users with long-acting methods was quite high; the proportion with sterilization was 53.5% (11.8% female sterilization and 41.7% for female sterilization), and the proportion of IUD users was 40.1%. As a result of government encouragement, the contraceptive prevalence of women who have one child was 85.2% with 85.1% of contraceptive users using IUD. The contraceptive prevalence of women who have two children was 93.7% of which 77.1% had surgical contraception.

NOTE: Because each chapter was prepared independently, the reader will note that the names State Family Planning Commission (SFPC) and State Commission of Family Planning (SCFP) have been used interchangeably.

Chapter 1

Recent Developments in the Family Planning Program in China

Jiang Zhenghua

During the past several years the family planning program in China has captured the attention of the highest levels of local and national leaders. As a result, the program has benefited from personnel, financial resources, and other support. Expenditures for the family planning program have increased rapidly, making possible considerable expansion of service networks at the grassroots level and improved service to women in remote areas who had no access to family planning advice or advanced contraceptive devices. Some localities have even established "horseback medical teams" to provide contraceptive services to women in mountainous and remote areas. Government officials have also been working to integrate family planning with efforts in the economic, educational, medical, social welfare, and security spheres. For example, family planning is promoted as a way to improve the status of women and protect their rights.

In recent years the country's economic boom has given rise to flourishing cultural and educational enterprises and as people's living standards, consumption patterns, and life styles have changed, so have their ideas on childbearing. A survey conducted in 1986 in Shandong Province found that about 64 percent of families wanted to have only one or two children. Six years later, a survey of families in Qingdao, Shandong, revealed that 91 percent of families living in the counties (excluding city dwellers and Suburban residents) wanted to have no more than two children and moreover, 95 percent of the families surveyed said they supported the family planning program. A third survey of 10,000 couples with an average per capita annual income of about 980 yuan in 12 rural counties in Jiangsu Province revealed that 28 percent wanted to have one child, 56 percent wanted two children, and 0.4 percent wanted to remain childless. The surveys also suggested a change in attitudes among young people in China. Whereas past generations wanted to have a son to help support them in their older years, the current generation of Chinese youth is more self-reliant. This attitude should contribute to lower fertility rates in the future.

The efforts of China's family planning workers have laid a solid foundation for a continued decline in the birth rate. The many successful experiences have been applied throughout the country upholding the principal of "three stresses": publicity and education, regular work and contraceptive services. China's official policy has been to oppose forced abortion and other coercive practices, and persons found guilty of such practices receive severe punishment. Unlawful practices are on the decline. At the same time, several other types of protection exist. For example, under the Law on Administrative Litigation, citizens can sue government officials. The National People's Congress is empowered to supervise government and the Chinese People's Political Consultative Conference is another channel for officials monitoring government activities.

The Family planning program has relied on the provision of full-scale motivational education and easily accessible health services to encourage voluntary family planning. This policy is increasingly viewed by the population as one that is in the interest of both the state and the individual. The massive publicity campaign to promote contraceptive services has helped to create a social environment favorable to the family planning program and the reshaping of ideas about when people should marry and the number of children they should have. The China Central Television Station launched a population and family planning program in 1987, which is broadcast once a week. By 1991, 24 provincial-level television stations and 230 other stations at the prefectural, municipal, or county levels had initiated special programs on family planning. These programs have reached 35 percent of the television-viewing audience. In addition, the Central People's Radio Broadcasting Station and 23 provincial or municipal radio stations also air programs on family planning. Family-planning oriented movies have also increased significantly.

In 1991 population and birth control issues became a frequent topic in the Chinese press. News organizations devoted considerable space to family planning coverage, and the quality of these reports improved markedly. Incomplete data show that news organizations in Beijing alone carried 1,600 reports on pregnancy prevention in 1991. Among the most popular are Women Are Human Beings Too, What a Joy, Wedding at Longfeng Township, The Story of Li Sangui, The Black Locust Tree, The Son-Bearing Mansion, and Lineage. In 1991 a nationwide campaign to publicize basic information about family planning was also launched. As part of this campaign, women of childbearing age are taught how to use contraceptive devices and how to take care of themselves and their children. The campaign uses many different channels of communication. In many parts of the country, for example, information on contraception is printed on handkerchiefs, stamps, and matchboxes. The program has been well received; by the end of 1992 almost half of the country had implemented the program.

In early 1993 the China Population Culture Promotion Society was established to better promote the family planning program among the population. In addition, two agencies of the State Family Planning Commission, the China Population News and the China Population Press, have played a role in publicizing information about the population growth rate and other demographic issues and health care for women and children. In addition, these two agencies publish textbooks and other teaching materials on family planning for various training courses.

To support the family planning program, the central and local governments have greatly increased budgetary allocations and improved service networks. Since the late 1980s, funds for the program have been growing at a double-digit rate annually, much higher than the rate of economic growth. This testifies to the importance that the government has placed on the program. In recent years service centers have been established in most counties. These centers are responsible for disseminating information on contraception, supplying contraceptives, and providing technical services to their local populations, especially childbearing women. They have played a major role in helping couples choose the most appropriate method of contraception, improve the effectiveness of the method they use, plan their families and take better care of their health and that of their children.

Incomplete data indicates that by 1991 more than 20,000 township-level service centers had been established throughout the country, covering almost 40 percent of the townships. About one fifth of the counties have established networks of service centers at the county, township, village, and neighborhood levels. In 1991 there were 242 prefecture-level service centers and 2,277 county-level centers. By 1992, the number of prefecture-level centers had grown to 272, the number of county-level centers had risen to 2,341 and the number of township-level service centers had reached 31,748. Overall, the number of service centers at all levels increased 8.3 percent from 1991 to 1992.

In recent years the number of family planning administrators has also risen considerably. During a period of government downsizing in 1989, not only were country- and district-level family planning organizations exempted, they were reinforced by the hiring of 8,000 additional staff -- two to three new staff members for each county-level family planning commission. By the end of 1991 China's family planning organizations employed more than 290,000 persons, 150,000 more than in 1986. For every 10,000 people nationwide, there are 2.6 family planning professionals; for every 10,000 rural residents, there are 2.3 family planning workers. In recent years the quality of the staff in family planning centers has also improved. Family planning authorities at various levels operate training courses for staff. In addition, staff are sometimes given more formal training at institutions of higher education.

Efforts have also been made to ensure the availability of safe and effective contraceptive devices, especially intrauterine devices (IUDS), which are used by 40 percent of Chinese women who use contraceptive methods. Scientific progress has made possible the introduction of new highly effective IUDS. As a result, the number of unplanned pregnancies has dropped significantly. By 1992, 81 percent of all contraceptive devices manufactured in China were copper IUDs. In rural areas, half of all IUDs used by women were made of copper. By replacing less effective metal-ring devices, the copper IUD reduced first-year failures by 20 percentage points, which, translates into 1.46 million fewer unplanned pregnancies a year.

The family planning program has also benefited from the involvement in recent years of the China Family Planning Association. This Association, the first nongovernmental organization to engage in family planning activities, operates through prestigious persons in villages and towns -- including senior members of the Communist Party, former government officials, and workers, retirees, and birth control activists --and functions as a link between the government and the public. It organizes family planning services and works to enhance public awareness of family planning as a national cause that concerns every Chinese citizen. The society is staffed by 55,000 full-time and one million part-time workers, making it one of the largest nongovernmental organizations in the country. By the end of 1991 the Association had set up 900,000 branches with a combined membership exceeding 40 million people. Branch associations exist in all the provinces, autonomous regions, and municipalities directly under the central government and in 98 percent of the country's prefectures (cities and districts), 95 percent of the counties, 85 percent of the townships and neighborhoods, and 75 percent of the villages. These branch associations have played a leading role in mobilizing the public to take part in the family planning program, providing contraceptive

services, improving contraceptive insurance, helping rural residents to improve production, and taking care of the aged and the young.

Another recent development in the family planning program is that since 1989 poverty-relief efforts have been integrated with family planning to reverse the vicious circle of childbearing and poverty. The government first tackled the issue of poverty in the early 1980s. In 1984 the State Council, the highest executive authority, issued a Notice on Alleviating Poverty. In 1986 the Fourth Session of the Sixth National People's Congress, China's legislature, listed poverty alleviation as a major item in the National Economic and Social Development Plan for 1986-1990. The State Council identified 331 counties as poverty-stricken and in need of additional state support. The provinces and autonomous regions in turn identified another 368 counties as poverty-stricken. These impoverished regions are typically located in areas lacking in natural resources. As a result, economic, cultural, and social welfare facilities are seriously underdeveloped. Many of these regions also have high population growth rates, aggravated by the vicious cycle of child bearing and poverty. In 1989 the State Council issued a report that had been drafted jointly by the State Family Planning Commission and the Leading Group for Developing Poverty-Stricken Regions. The report called for integrating poverty-relief efforts with the family planning program. As a result, some impoverished regions have formulated policies that provide for poor families that accept contraceptive services to receive preferential treatment, such as obtaining poverty-relief loans, and employment assistance and helps in acquiring agricultural materials and marketing farm products. These incentives serve to encourage poverty-stricken households to raise their living conditions by limiting their families, improving the well-being of family members and increasing their income.

Between 1985 and 1992 the government issued 29.35 billion yuan in poverty-relief loans including low-interest loans with funding for economic development activities and special loans for designated regions. These funds have helped impoverished regions to improve their economic situation. For example, residents in Jinzhai County, in Anhui Province, realized that to improve economically they must "bear fewer children and plant more trees." Wangcang County, in Sichuan Province, formulated a strategy that incorporates economic development with family planning; and Longsheng County, in Guangxi Zhuang Autonomous Region, launched a program aimed at encouraging farmers to have fewer children and produce more grain.

As a result of efforts to alleviate poverty, the number of people living below the poverty line (whose annual income is less than 200 yuan) dropped by 36 percent, from 125 million people in 1985 to 80 million people in 1992. In the 699 counties that received large amount of aid from the state and local governments, the per capita income of farmers rose by 55.4 percent, to 377.2 yuan . Most of those regions are now self-sufficient and able to feed and clothe the population.

Finally, governments at various levels have introduced incentives to encourage couples to practice contraception. Incentives to encourage couples to delay marriage and childbearing include a 10-day paid wedding vacation and six months' maternity leave. Couples with only one child receive a special allowance. Families that agree to practice contraception also receive other incentives, including free housing, medical care and education for their children, assistance finding

employment, a farm and farming equipment; and family planning insurance. That policy embraces old-age insurance for couples with one child, health insurance for only children, insurance for permanent methods, and health insurance for both mother and baby. In addition, some rural communities offer a pension for couples with two daughters. All these measures have been instrumental in changing thinking about childbearing.

In conclusion, the success of China's family planning program is due primarily to the efforts to educate the public and provide couples of child-bearing age with a range of services, including contraceptive devices that incorporate current scientific and technological thinking.

Chapter 2

Demographic Change from 1982 to 1992

Chen Shengli

In 1992 China conducted a national population census. Following the third national population census and one-per-thousand sample survey on fertility and birth control, both undertaken in 1982, several large-scale population surveys have been conducted , including a 1 percent population sample survey (1987), a 2 percent population sample survey (1988), and a population survey of 380,000 persons (1992). These surveys and censuses reveal that between 1982 and 1992 significant changes took place with regard to the age structure, marriage patterns, fertility levels, and use of contraception of China's population. A dramatic drop in the fertility level has aroused particular attention. Studying the demographic changes, during this period provide both an understanding of China's current population trends and a scientific basis for formulation of population policy.

Consideration of China's population change between and 1982 and 1992 should start with an analysis of the population in the early 1980s. The most striking characteristic of China's population is its huge size. Data collected during the census showed that the population had reached a record 1.03 billion --a record high for China and a level that no other country has ever attained. China's national family planning program was launched in the early 1970's. Special government units and administrative organizations were established to implement the family planning program. Between 1970 and 1981, the crude birth rate dropped 1.3 percentage points to 20.9 per thousand. The total fertility rate dropped 3.18 percentage points, to 2.63. First births represented 46.6 percent of all live births, an increase of 25.8 percentage points; the proportion of higher-parity-births was 28.1 percent, a decline of 34.1 percentage points. The mean age at first marriage for women was 22.7 years in 1981 an increase of 2.3 years. The prevalence of contraception reached 69.7 percent, an increase of 55 percent.

Based on the age-specific fertility rate for 1970, there were 150 million fewer births in China during 1972-1982 than one would have expected. By the early 1980s the trend of the rapid population growth had been curbed and China's population experienced an important demographic transition. In 1971 the country had a high birth rate, a low death rate and a high rate of natural increase; by 1982 China had a low birth rate, a low death rate and a low rate of natural increase.

The achievements of the family planning program between the early 1970s and the early 1980s showed that in economically less-developed areas with a higher rate of natural increase, the high population growth rate could be slowed even in areas in which the poorest population lived. The solid foundation for family planning efforts that had been made by the early 1980's paved the way for a further decline in the rate of population growth and also made possible the social and economic development that China has experienced since the 1980s. Thus, the family planning program had far-reaching significance.

However, China still faced several population issues. First was the sheer size of it's population. The strains that the huge population placed on the country's social and economic infrastructure-- employment, transportation, energy, environment and housing-- were becoming more severe. Second was the country's total fertility rate which at 2.63 exceeded the replacement level. If this fertility rate was unchanged China's population would continue to grow. Thirdly, the New Marriage Law enacted in 1981 had lowered the legal age of marriage from 23 years to 20 years, and a drop in the mean age at first marriage and a dramatic increase in the number of married people were expected. Finally, in 1983 more than 29 million young Chinese born during a baby boom that began in 1963 would become 20 years old and many of these baby boomers would marry and begin their families. This baby boom lasted about 10 years and created great pressure on China throughout most of the 1980s and the 1990s in terms of first marriages and births. Thus, the population situation in China in the early 1980s was grave, and the family planning program faced a considerable challenge.

China's population grew from 1.02 billion to 1.18 billion between 1982 and 1992. The country gained 140 million people, more than the populations of Germany and France combined. By 1992, the growth of the population and increased use of arable land for construction had reduced the amount of arable land in China at an annual rate of 2 percent. This represented 193 acres per person less than had existed in 1982. In 1992 the average amount of grain per capita was 380 Kilograms the same as the level in 1983. The age structure of China's population has also shifted since 1982. Census data show that 4.9 percent of the population was aged 60 or older in 1982 (Table 2-1), slightly below the international standard. In 1992, people aged 60 or older made up 5.7 percent of China's population. In 1982 the aged-child ratio was 14.6 percent, indicating a young population; in 1992 the ratio was 21.0 percent indicating a more elderly population. As measured by these two indicators, the proportion of the population aged 60 and older and the aged-child ratio, China's population experienced a transition from a young population to an adult one between 1982 and 1992.

Table 2-1. Age structure of China's Population, 1982 and 1992

Year	Proportion of population age 60 or older	Proportion of population age 15 or younger	Aged-child ratio	Median Age
1982	4.9	33.6	14.6	27.1
1992	5.7	27.1	21.0	28.7
International standard	5-10	30-40	15-30	20-30

The efforts of the family planning program since the 1970s resulted in a decrease in the high fertility level of previous years, and changes therefore first occurred in the proportion of children aged 15 or younger and in the median age. However, such changes occurred only in a few age groups. China's population did not become an adult one until the 1990s.

The number of women who married for the first time topped 10 million in 1980 (table 2-2) from an average of 6.14 million in the 1970s. In 1982, 10.19 million women entered into first marriages. There was an unprecedented "marriage craze" during 1982-92 because of the dual effect of the new marriage law and the large number of people reaching the legal age of marriages as discussed earlier. The number of women with a first marriage was much smaller prior to the 1980s. For instance, the annual number of first marriages for women was 3.02 million in the 1940s, 3.77 million in the 1950s, 4.84 million in the 1960s, 6.14 million in the 1970s and 11.27 million after the 1980s. The sudden large increase in number of first marriages imposed tremendous pressure on China to control population growth.

There are two basic causes for the "marriage craze." First, the New Marriage Law, which took effect in 1981, lowered the legal age of marriage by three years. A decline in the mean age at first marriage and an increase in the number of early marriages (first marriages for women 23 years old or younger) resulted. In 1982, 3.14 million women married early. Second, although the rate of early marriages declined after 1982 the number of people who reached the legal age of marriage and who married increased because of the structure of the population.

The rate of early marriages is an indicator which can be used to make a better comparison. In many places, prior to the enforcement of the New Marriage Law, a later age of marriage was used as one of the major qualifications for marriage registration and the rate of early marriage was rather low. For example, the rate of early marriages in 1977 dropped to less than 18 percent and kept the same level till 1980. The New Marriage Law was first introduced in 1981 and the legal minimum limit for the marriage age reduced by three years, compared to the age for late marriage. As the actual age limit for marriage registration dropped, the rate of early marriages went up accordingly. In 1982 it increased to 30.8%. However, after 1983, the impact of the fluctuation resulting from the change of the legal marriage age was gradually eliminated. The rate of early marriage began to decline once again and kept dropping in the context of the implementation of the New Marriage Law. The rate of early marriage for women declined to 16.8% in 1991 and to 12.9% in 1992, arriving at the lowest level seen in recent years.

Data from the 1982 and 1992 population censuses reveal that during 1982-1992 the illiteracy rate for young people of both sexes declined and their educational attainment increased. The drop in the rate of early marriage during the period despite the New Marriage law may have been partly due to the increased educational attainment of young people of childbearing age and partly due to the information, education, and communication efforts of the family planning program and it's advocacy of later marriage.

Table 2-2. Trends in women's first marriage, 1980-1992

Year	Number of first marriages (millions)	Number of early marriages* (millions)	Rate of early marriages (percent)	Rate of late marriages** (percent)	Mean age of women
1980	10.68	1.93	18.0	45.6	22.6
1981	10.65	2.36	22.1	44.1	22.4
1982	10.19	3.14	30.8	36.9	22.0
1983	9.31	2.63	28.3	30.0	21.7
1984	10.28	2.79	27.1	24.1	21.6
1985	11.85	2.98	25.1	21.9	21.6
1986	12.16	3.07	24.5	25.2	21.7
1987	11.93	2.79	23.6	29.0	21.8
1988	12.79	2.85	23.4	29.4	21.8
1989	11.93	2.64	22.2	30.5	22.0
1990	12.79	2.62	20.5	29.0	22.0
1991	11.27	1.90	16.8	31.8	22.0
1992	11.06	1.43	12.9	36.5	22.5

Source: State Family Planning Commission Sample Survey of women of childbearing age, 1992.
*Marriage by a women 23 years old or younger .
** Marriage by a woman 24 years or older.

In both 1980 and 1981 the rate of late marriages for Chinese women exceeded 40 percent. With the implementation of the New Marriage Law in 1982, the rate declined to 36.9 percent in that year and subsequently reached the lowest level in Chinese history (21.9% in 1985). The rate has then increased steadily returning to its 1982 level in 1992. Nonetheless, the rate for 1992--36.5 percent--is significantly below that for 1980 when the minimum age for marriage registration was 23 years rather than 20 years. These data show that the advocacy of late marriage may have had an effect on age at first marriage.

As China's young people attained higher levels of education over the past five decades, the age of women at first marriage has shown an upward tendency as well. Data from the population sample surveys in 1982 and 1992 reveal that the mean age for Chinese women at first marriage increased from 18.5 years in the 1940s to 19.0 years in the 1950s, 19.8 years in the 1960s, 21.6 years in the 1970s, and 21.9 years in the 1980s. As shown in table 2-2, the mean age of women at first marriage declined between 1981 and 1985 but then resumed its upward trend. Since 1989 the mean age of women at first marriage has been about 22 years, compared with a mean age of about 24 years of women in industrial countries. As China's economy grows and its people attain a higher cultural level, and with vigorous promotion of late marriage, a further rise can be expected in the mean age at marriage for Chinese women.

According to the 1 percent population survey, 69.7 percent of the 170.2 million married women of childbearing age used some form of contraception in July 1987 (Table 2-3). Among couples using contraceptives, 11.7 million men had vasectomies, 29.9 million women had tubal ligations, 59.2 million women used intrauterine devices (IUDs), 10.0 million women took pills, 2.4 million used condoms and 5.3 million couples chose other methods.

Table 2-3. Contraceptive prevalence rates (%) by method in 1982, 1988 and 1992

Year	Total	Vasectomy	Tubal Ligation	Intrauterine Device	Hormonal Method	Condom	Other Methods
1982	69.7	6.9	17.6	34.8	5.9	1.5	3.0
1988	71.2	7.8	27.2	29.5	3.5	1.9	1.2
1992	83.4	9.8	34.7	33.5	3.1	1.5	0.7

According to the two percent population survey, 71.2 percent of the 205 million married women of childbearing age used some form of contraception in July 1988. Among couples using contraceptives 16.0 million men had vasectomies, 53.7 million women had tubal ligations, 60.5 million women used the IUD, 7.2 million women took pills, 3.9 million couples used condoms, and 2.5 million couples used other contraceptive methods.

Based on data from the survey of 380,000 in 1992, there were estimated 240 million married women of childbearing age in 1992. Nearly 200 million of these women and their husbands, or 83.4 percent used some form of contraception. Among couples, 24.0 million men had vasectomies, 83.0 million women had tubal ligations, 80.0 million women used IUDs, 7.6 million women used pills or injectables, 3.6 million couples used condoms, and 1.8 million couples used other methods.

Although there was little difference between the contraceptive prevalence rates for 1982 and

1988--only 1.7 percentage points-- the mix of methods chosen was different (table 2-3). In 1988 more men had vasectomies and more women relied on tubal ligations; the share of women who chose IUDs or hormonal methods declined in 1988. The contraceptive mix for 1992 shows a continuation of these trends and a rebound in the use of IUDs. The trend over 1982-1992 is for couples to rely more on permanent methods and longer term methods.

Table 2-4. Rate of natural population increase, 1980-92

Year	Total Population (million)	Birth Rate (per thousand)	Death Rate (per thousand)	Rate of Natural Increase (per thousand)
1980	987.0	18.2	6.3	11.9
1981	1,000.7	20.9	6.4	14.5
1982	1,016.5	22.3	6.6	15.7
1983	1,030.1	20.2	6.9	13.3
1984	1,043.6	19.9	6.8	13.1
1985	1,058.5	21.0	6.8	14.3
1986	1,075.1	22.4	6.9	15.6
1987	1,093.0	23.3	6.7	16.6
1988	1,110.3	22.4	6.6	15.7
1989	1,127.0	21.6	6.5	15.0
1990	1,143.3	21.1	6.7	14.4
1991	1,158.2	19.7	6.7	13.0
1992	1,176.7	18.2	6.6	11.6

Source: Data prior to 1991 from China's Statistical Yearbook, (1991); data for 1991 and 1992 are from population sampling surveys conducted by the State Statistical Bureau.

Between 1988 and 1992, the contraceptive prevalence rate increased by 12.2 percentage points (table 2-3). During 1988-1992, the number of women of childbearing age increased by 34.6 million, but the number of couples using contraception increased by 54.0 million. Of these new adopters of contraception, surgical contraception was the choice of 35.1 million men and women and IUDs were chosen by 19.8 million women while those using other methods dropped by 9 million. The large increase in contraceptive prevalence during this period has contributed to the large decline in fertility rates seen in recent years.

In 1982 the crude birth rate was 22.3 per thousand and the crude death rate was 6.6 per thousand resulting in a rate of natural increase of 15.7 per thousand (table 2-4). The birth rate and the rate of natural increase in 1982 were both higher than in previous years since 1975. Both indicators declined in 1983 and 1984, and then peaked at 23.3 and 16.6 per thousand, respectively, in 1987. Between 1988 and 1992 the two indicators continued to decline, dropping to 18.2 per thousand and 11.6 per thousand, respectively ---the lowest levels since 1980.

Table 2-5. Number of births by parity for selected years, 1970-92 (million)

Year	High-parity births (millions)	Second births (Millions)	First births (millions)	Total (Millions)
1970 (peak)	15.69	5.22	6.44	27.36
1979 (bust)	6.52	4.61	6.13	17.27
1982 (peak)	5.72	5.71	11.05	22.47
1984 (bust)	4.63	5.66	10.34	20.63
1987 (peak)	4.21	8.02	12.97	25.29
1992 (bust)	2.45	6.93	11.81	21.19

Source: Data for years before 1987 were estimated using data from the China Statistical Yearbook (1991); data for 1992 were estimated using data from the 1992 survey of 380,000 respondents.

The growth rate can be analyzed by considering the number of births by parity. Table 2-5 lists years from 1970 to 1992 in which baby "booms" or "busts" occurred. The birth peak in 1982 is attributed mainly to the influence of the New Marriage Law enacted in 1981. There were 4.92 million more first births in 1982 than in 1979, a rise of 81.1 percent. The second births also increased; there were 1.10 million more second births in that year than in 1979, a 23.7 percent increase. There were fewer high-parity births (third births and higher) in 1982 than in 1979.

A birth bust occurred in 1984 for two main reasons: a drop in first births in 1984 because of the low birth rate in 1961 and a further drop in high parity births in 1984 because of the increased prevalence of vasectomies and tubal ligations. Another birth peak, the highest one since 1970, occurred in 1987. There were 2.63 million more first births in 1987 than in 1984, an increase of 25.4 percent. The two reasons were the periodic effect of the birth peak that occurred in 1963 and a drop in the mean age of first marriage between 1980 and 1985 and the resulting increase in first marriages. Second births increased substantially in 1987; there were 2.36 million more second births in 1987 than in 1984, an increase of 41.6 percent. The two reasons for this increase were the increase in first births since 1980 and the relaxation of the regulations on second births, especially in rural areas.

It is worth mentioning that the number of high-parity births dropped in 1987 relative to 1984. because high-parity births were still strictly restricted. As in 1982, the birth peak in 1987 was due mainly to the implementation of the New Marriage Law in 1981 and the periodic effect of the birth peak in 1963 (not shown).

After 1987, the total number of births in each parity declined, with the largest percentage decline in third or higher births. During this period the mean age at first marriage increased steadily and the number of first marriages experienced a corresponding reduction as a result of intensified efforts to educate the public about the benefits of late marriage and late childbearing. In 1992 there were 11.81 million first births, 200,000 less than the expected number based on population projections. Between 1987 and 1992 second births and high parity births both declined substantially. Both the birth rate (table 2-4) and the number of births have also declined since 1987.

The large decline in both the birth rate and the number of births since 1987 has had an important impact on China's population. First, it has slowed the rapid growth of the population. Second, it has resulted in important changes in the age structure of population. It is believed that the decline in the birth rate since 1987 can be viewed as an important change in China's population growth rate and has laid a solid foundation for realizing population goals for the 21st Century.

The marked change in China's total fertility rate (TFR) has a stimulated discussion both within China and in the international community. China's total fertility rate dropped 1.14 percentage points between 1982 and 1992 (table 2-6). The decline does not appear to be linear. The total fertility rate rebounded during 1986-89 for reasons explained earlier and then dropped sharply, decreasing 0.57 percentage points from 1989-92.

The components of the decline in the total fertility rate can be seen for both first-parity births and second-and higher-parity births. First-parity births declined from 1.37 in 1982 to 1.02 in 1985, and after increases in 1986 and 1987, declined to 0.92 in 1991 and 1992. The total fertility rate for second and higher parity births declined from 1.49 to 0.80 in the same time period even with the increase seen between 1986 and 1989.

Although the age at marriage has contributed somewhat to the decline in fertility in China,

the principal determinant of the decline has been increased use of contraception, especially the increase in permanent nonreversible methods to limit childbearing.

Table 2-6. Total Fertility Rate (TFR), 1982-92

Year	TFR	TFR by first parity	TFR by second and higher-parity
1982	2.86	1.37	1.49
1983	2.42	1.18	1.24
1984	2.35	1.11	1.24
1985	2.20	1.02	1.18
1986	2.42	1.07	1.35
1987	2.61	1.13	1.48
1988	2.33	1.02	1.31
1989	2.29	0.99	1.30
1990	2.09	0.95	1.14
1991	1.87	0.92	0.95
1992	1.72	0.92	0.80

Source: Data for 1982-86 are from the 1988 population two per thousand sample survey; data for 1987-91 are from the 1992 Survey of 380,000 respondents.

Chapter 3

The Fertility Status of Chinese Women in Recent Years

Yu Jingyuan and Yuan Jianhua

According to survey data collected annually by the State Statistical Bureau, the total fertility rate of Chinese women decreased from a replacement level of 2.18 in 1990 to 2.02 in 1991 and then to 1.83 in 1992—a two-year decline of 16.1 percent. These data seem to attest to the success of efforts to control population growth. This chapter examines the reliability of previously published annual fertility data for 1980–1992 using data from population sampling surveys conducted in 1988 and 1992. The 1988 survey was a two per thousand sampling survey; the 1992 survey was a sample of 380,000 women of childbearing age. The 1992 survey collected information on the age structure of the population and the parity distribution of women and births, data that had not been gathered previously.

The 1992 population sampling survey recorded the years of the last four births to women aged 15–49 at the time of the survey. The timing of earlier births for women who had more than four children can be estimated indirectly. Fourth- and higher-parity births were rare during 1980–1992 because of the vigorous promotion of the family planning program. Of the 55,367 women aged 15–49 who gave birth during 1980–1992, only 526 had fourth- or higher-parity births. Children were born to 40,786 women during 1986–1992; only 47 of these women had fourth- or higher-parity births. Therefore, we did not have to reconstruct the fertility history for many women, and we used a relatively simple methodology. We assumed that births prior to the last four were regularly spaced between the mean age of first marriage for this group of women and the age of the women when she had the earliest birth recorded in the survey.

Table 3-1. Total Fertility Rates Calculated Using Age-Specific Fertility Rates, 1980-1992

Year	TFR using data from the 1992 survey	TFR using data from the 1988 sampling survey
1980	2.39	2.4
1981	2.56	2.6
1982	2.79	2.9
1983	2.41	2.4
1984	2.31	2.4
1985	2.28	2.2
1986	2.46	2.3
1987	2.57	2.5
1988	2.28	–
1989	2.24	–
1990	2.04	–
1991	1.66	–
1992	1.47[1]	–

[1]It was assumed that 70 percent of all births in 1992 occurred between January 1, 1992, and the period during which the survey data were collected.

As shown in table 3-1, there were birth peaks in 1982 and 1987 and a trough in 1985. Between 1980 and 1990, the fertility level was above the replacement level. The fertility level registered a steady decline in 1987–1992; the greatest drop was in 1990–1991.

The fertility levels calculated using data from the 1988 sampling survey and the 1992 sampling survey are fairly consistent. For 1980 through 1984 the TFRs derived from the 1988 survey are slightly higher than those derived from the 1992 survey; for 1985 through 1987 the TFRs derived from the 1992 survey are higher. We also calculated total fertility rates using age-specific parity progression ratios from the 1992 survey (table 3-2). This indicator provides the average number of lifetime births per woman that would occur if a group of women experienced the parity progression ratios estimated for a given period of time over their lifetimes. The parity progression ratio PO is the proportion of all women who give birth to at least one child. P1 is the proportion of women with one child who have a second child, P2 is the proportion of women with two children who have a third child, and so on. The formula relating TFR to the parity progression ratios is:

$$TFR = PO + (PO)(P1) + (PO)(P1)(P2) + (PO)(P1)(P2)(P3) + [(1/(1 - P3+)].$$

Table 3-2. Total Fertility Rates Calculated Using Age-Specific Parity Progression Fertility Rates and Parity Progression Ratios, 1980-1992

Year	Total fertility rate	Parity progression ratio			
		0–1	1–2	2–3	3–4+
1980	2.5697	.984	.904	.522	.335
1981	2.5335	.991	.904	.495	.315
1982	2.5928	.996	.862	.546	.365
1983	2.3861	.995	.849	.454	.296
1984	2.2769	.992	.795	.439	.301
1985	2.2833	.990	.798	.441	.308
1986	2.4274	.992	.838	.480	.342
1987	2.4993	.991	.866	.488	.354
1988	2.2880	.989	.794	.453	.310
1989	2.2537	.987	.770	.429	.356
1990	2.0975	.987	.738	.365	.305
1991	1.7604	.983	.601	.255	.193
1992	1.6616	.987	.562	.182	.156

The trend in the total fertility rate shown in table 3.2 is consistent with that shown in table 3.1: The fertility rate was high in 1982 and 1987 and declined in the years after 1987. However, the two methods of calculation produce different magnitudes of change. The first method gives a total fertility rate for 1982 of 2.79; the second method gives a rate of 2.59. The age-specific fertility rate method and the parity progression ratios method produce more similar TFRs for 1987: 2.57 and 2.50, respectively. The age-specific fertility rate method produces a rapid decline after 1987 (table 3-1), whereas the parity progression ratios method produces a slower decline (table 3-2). Another characteristic of fertility change in China is the regularity of the change in the fertility level from one parity to the next (no change is evident from zero to the first parity). The fertility level began to decline in 1983, dropped to the bottom of a trough in 1984, peaked in 1987, and began to drop again thereafter.

The TFR's from the 1992 survey are considered with the TFR's estimated from the 1988 survey for the years 1980-1987. Estimates from the 1992 survey for the period after 1987 show a continued decline with estimates for the 1990-1992 period actually being lower than the official statistics from the State Statistical Bureau. The TFR's for 1990-1992 using parity progression ratios are not as low as those based on age-specific fertility rates, but still lower than the official statistics. The decline between 1990-1992 is the result in declining parity progression ratios for all parities, with the exception of the progression from parity zero to parity one.

Chapter 4

Contraceptive Prevalence in China: Findings from the 1992 National Family Planning Survey

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In October 1992, the State Commission on Family Planning in China conducted a nationally representative family planning household survey. Information was obtained on basic socio-demographic characteristics and ethnic background of all individuals in the sample households. In addition, for ever-married women of reproductive age, data on their reproductive history and current contraceptive use were also collected.

In this chapter, we exclusively deal with analysis of the survey data on contraceptive prevalence among the eligible women, i.e., the proportion of ever married women of reproductive age who were practicing contraception at time of interview. First, we will describe trends in contraceptive prevalence in China for the past decade by comparing the 1992 data with the results of the previous two national surveys conducted in 1982 and 1988. Second, we report the socio-demographic, ethnic, and geographic differences in current contraceptive prevalence for all ever-married women. Third, we examine the current status of contraceptive practice and specific method used by women with no children, one child, and two or more children, respectively, and the ratio of female to male sterilizations. Fourth, we discuss policy implications associated with findings from the data analysis. Finally, further research needs are proposed with the objective of bringing about further improvements in the current family planning program.

There are four main objectives of this analysis:

1) To describe recent trends in contraceptive prevalence. In the past decade, the State Commission on Family Planning has conducted three national family planning surveys. These took place in 1982, 1988, and 1992. The three surveys all interviewed a sample of women representative of the nation as a whole. Therefore, comparisons of the results obtained from these surveys enable us to observe recent trends in contraceptive prevalence.

2) To document the performance of the national family planning program. Analysis of the survey results reveal the current national profile of contraceptive users. This enables us to measure the extent to which the national family planning program has achieved its program objectives.

3) To report on program implications associated with the survey findings. The level of contraceptive prevalence in China reflects national and local family planning programmatic effort as well as the quality of family planning service availability in local communities. Comparisons of the socio-demographic differentials and regional variation in contraceptive prevalence and method mix will therefore help to identify the potential for further improvement in the provision of family planning program services. In particular, observation of the differentials in method-specific contraceptive use may have very important implications for current program strategies.

4) To recommend proposals for further research. Research conducted in China, and elsewhere, indicates that the overall safety and efficacy of contraceptive use depend on the methods used, the socio-demographic characteristics of users, quality of services, and training of providers. In this paper, data analysis on method-specific prevalence by the user's characteristics, accessibility to service, and geographical setting is included. The results of the analysis prompt discussion on issues related to contraceptive safety and efficacy as well as program policy and strategies that require further research.

There was a total of 363,036 de-facto residents in the sample households who were successfully interviewed. The defacto residents are defined as those who were actually residing in the sample areas regardless of official household registration. Of all residents interviewed, 73,946 respondents were ever married women 15-49 years of age. The data for these women will be used for this analysis; variables include the following for each respondent:

a. Age at time of interview.
b. Current contraceptive user or not.
c. Method currently used (if current user).
d. Ethnic background.
e. Number of live births ever had.
f. Educational level.
g. Access to family planning services.
h. Geographic region and province of residence.

All variables listed above are self-explanatory except for the last two: access to family planning services and geographic region. The variable used for access to family planning services is classified into two categories: urban and rural residents. The urban residents include those who reside in metropolitan areas or provincial and county cities. In these areas, family planning services are generally available within 1 kilometer of their residence. The rural residents are divided into four sub-categories based on the distance in kilometers to the closest family planning clinic or health clinic.

The last variable refers to the official administrative divisions of the Chinese government that includes 6 geographic regions. Each region includes several provinces and/or metropolitan areas. They are as follows:

a. North: Beijing, Tianjin, Hebei, Shanxi, and Inner Mongolia.
b. Northeast: Lianing, Jilin, and Helongjiang.
c. East: Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, and Shandong.
d. South: Henan, Hubei, Hunan, Guangdong, Guangxi, and Hainan.
e. Southwest: Sichuan, Guizhou, Yunnan, and Tibet.
f. Northwest: Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang.

The results of the three national family planning surveys conducted in the past decade (1982, 1988, 1992) indicate that the increase in contraceptive prevalence, from 70 to 85 percent, occurred during the second half of the decade (Table 4-1). Corresponding to this upward trend in contraceptive prevalence,

a similar accelerated downward trend in the level of fertility was also observed (1). Table 4-1 shows that the contraceptive prevalence, i.e., in this case, the percentage of ever-married women who were currently using contraception, increased slightly from 69.5% in 1982 to 71.1% in 1988, and to 84.6% in 1992 (2,3). Therefore, in the last 4 year period (1988 to 1992), there was a much greater increase in contraceptive use (13.5 percentage points) than in the first 6 year period (1.6 percentage points). Corresponding to this increase in contraceptive prevalence, the total fertility rate (TFR), which showed a slow decline for the first 6 year-period, accelerated during the more recent 4 year-period. From 1982 to 1988, the estimated TFR per woman went from 2.63 births to 2.57 (2,3), a decline of only 0.06 births per woman. Then, from 1988 to 1992, the TFR rapidly declined from 2.57 to 1.72 (1), a decline of 0.85 births per woman. In an evaluation of the survey data, Zeng Yi argues that, since the 1992 survey may have had an under-reporting of births, the true TFR per woman in 1991-92 was around 2.1 or 2.2 (4). However, even this estimate of a decline of about 0.5 births per woman in the last decade indicates that China has at least achieved a replacement level fertility rate, and perhaps the TFR is less than replacement level.

Women with characteristics usually associated with lower contraceptive use and women who lived in harder-to-reach areas had greater increases in contraceptive prevalence in the most recent 4 year period. Thus, the socio-demographic, residential and regional differentials in contraceptive prevalence previously seen have been considerably attenuated. Table 1 shows that, from 1988 to 1992, the oldest as well as the youngest age groups had the greatest increases in contraceptive use. Women who had five or more children had a significant increase in their rate as well as one-child women. Both 1982 and 1988 surveys showed that, among different education groups, women with a high school level of education had the lowest rate. This is possibly because they were younger, and had a higher proportion of childless women. From 1988 to 1992, women in the lower education groups and in rural areas showed the greatest increases in contraceptive use. The contraceptive prevalence rate of rural residents increased more substantially than that of the urban residents; thus, the urban-rural differential was essentially nil in 1992. There was very little ethnic differential in the rate increase. By geographic regions, the Northwest and South regions, where the rates were the lowest in 1982, had the highest percentage point increases in prevalence during the past decade.

Table 4-2 presents the percentage distribution of current contraceptive users and non-users, and the breakdowns of specific methods for the users at the time of the three surveys. Although there was only a small increase in total contraceptive prevalence from 1982 to 1988, the use of female sterilization increased by more than 50%. From 1988 to 1992, there was not only a 19% increase in the rate of over-all contraceptive prevalence but also important increases in the proportion of women using more effective methods. Forty-six percent were using female and male sterilization and 33% were using the IUD.
The increase of 1.6 percentage points in current contraceptive use from 1982 to 1988, was the result of an increase in female and male sterilization (10.5%) largely off-set by decreases in IUD, the pill, and methods other than condom. However, the increase of 13.5 percentage points from 1982 to 1988 resulted from large increases in female and male sterilization as well as an increase in IUD use.

The family planning policy in China has resulted in great differentials in the level of contraceptive prevalence by number of children. Table 4-3 shows that while 84.6% of all ever-married women were currently using contraception, the childless had an extremely low rate of 5.4%. By contrast, women with one child or two or more children both had very high rates; 85.5% and 93.2%, respectively. The substantial age differential for the youngest women reflects their lower number of children. The differentials in education, access to service, and regions were very small. However, prevalence is significantly lower for rural women who live ten or more kilometers from a service point and for women

living in the Northwest region compared to other regions except for the Southwest Region. Since minorities can have two children, Table 4-3 also shows that, compared to the ethnic Han (85.6%), the minorities had much lower rate of contraceptive prevalence (69.9%). However, the patterns by number of children, age and education of women, access to service, and regions were similar between the Han and the minorities.

Table 4- 4 indicates that the patterns of contraceptive prevalence by age and education of women, and access to family planning services were very different when number of children are controlled. The age-specific contraceptive prevalence rates among the childless were uniformly low. These rates document the very low proportion of young married women who practice contraception for spacing reasons or not to have any children. The extremely low rate of 2.6% for the oldest women (45-49 years old) indicates either that they have fecundity problems or they want to be childless. However, among the childless, the rate was higher for women with the highest education level indicating greater interest to delay their first birth. The rate for childless women in urban areas is noticeably higher (12.5%) than in rural areas (3.4%), reflecting the fact that urban areas have a much greater proportion of women with higher education.

For women with one child, the age pattern of contraceptive prevalence was similar to that of the total number of women: the younger and older women both had lower rates; women with higher education also had higher rates of contraception. A very high rate (91.7%) was found in urban areas, where family planning services are very accessible, while in rural areas, the rates decreased as the distance from family planning services increased. Some regional variation in the prevalence rate was also observed, with the Northeast having the highest (92.4%) and the Northwest having the lowest (71.9%).

For women with two or more children, the age pattern of contraceptive prevalence was similar to that of the total number of women: the younger and older women both had lower rates, but were both above 80%. Very high rates cut across all educational groups; 92.3% for women with no formal education, 93.8% for primary school, 93.3% for junior high, and 93.6% for senior high or higher. The regional differences in the contraceptive prevalence rate were rather small; the Northeast reached the highest (95.9%), and the Northwest had the lowest rate (88.3%). These results indicate that education and urban-rural residence of women are the two main factors differentiating the rate of current contraceptive practice among women with less than two children. Therefore, it would be of interest to look at rates of contraceptive prevalence for different educational groups of women by urban-rural residence by number of children. Table 4-5 shows that, for childless women, in urban areas, contraceptive use increases as education increases, but in rural areas, the rates were equally very low among all educational groups. For one-child women, the rate for each educational group was consistently higher in urban areas than in rural areas, e.g., for women with primary or less education, the rate was 87.9% in urban areas compared with 79.0% in rural areas, and, for women with senior high or higher education, the rate was 92.6% in urban areas compared with 87.9% in rural areas. These findings imply that both education of women and rural-urban residence have some independent effect on contraceptive use levels.

For women with two or more children, controlling for urban-rural residence, there is very little difference by level of education in the use of contraception. Rates are actually somewhat higher in rural areas. The extremely high rates of contraceptive practice for women with high and low education alike regardless of residence, underscore the successful performance of the current family planning program in serving very hard to reach segments of the population. The number of children born to women was not only related to the contraceptive prevalence rate but also affected the methods of contraceptives used as well (table 4-6). The low percentage of childless women using contraception mostly used three types of

reversible methods; the one-child women mainly used the IUD; and couples with two or more children had a large proportion of female or male sterilizations. Table 6 shows that the principal methods used by the childless were condom 1.9%, pill 1.4%, and the IUD 1.2%. For the one-child women, IUD was the major method (72.6%), followed by the pill (5.6%), and condom (3.4%). Female and male sterilizations were even lower at a combined rate of 2.6%. For couples with two or more children, 74.1% reported surgical contraception, with almost four-fifths having tubal ligation (57.7%) and one-fifth vasectomy (16.4%), followed by IUD (16.3%), and other methods [oral pill, condom, and other methods combined (2.8%)].

We have observed socio-demographic and regional differentials related to contraceptive prevalence and method mix, in particular, by number of children. Results from two studies indicate that the use-effectiveness of contraceptive methods may be related to the personal characteristics of users and the quality of service provided by providers (5, 8). In this section, we will describe the profile of contraceptive methods used by socio-demographic and regional variables. Table 4-7 presents the contraceptive method mix by socio-demographic variables and regional differences for all users by three categories: Sterilization, IUD and other reversible methods. The percentage distributions shown in the table are based only on current contraceptive users and excludes non-users. Therefore, the patterns of contraceptive method used by number of children will be more distinct than that shown in the previous Table 4-6. For childless users, 69.6% were using pills, condoms or other reversible methods, and 21.9% were using IUDs. Among one-child users, 85.0% were using IUDs, and 12.1% using other reversible methods. For couples with two or more children, 79.6% were sterilized, and 17.4% were using IUDs. The table also indicates the contraceptive pattern by age and education of women, access to service and region.

The patterns of contraceptive use were distinctly different by number of children, therefore, it will be more meaningful to investigate the patterns controlling for number of children of the users. Since the childless users were so few, they will not be shown. However, we will scrutinize the patterns for one-child women and women with two or more children, respectively.

a. Patterns of Contraceptive Methods Used by One-Child Women

Although the IUD was the primary method used by one-child women, the pattern of contraceptive use by age group was considerably different. Table 4-8 indicates that the youngest age group (15-24) had the highest proportion of IUD use (89.9%) and the lowest proportion of other reversible methods (9.5%) and sterilization (0.6%). In contrast, the oldest age group (45-49) had the lowest proportion of IUD use (48.8%) along with the highest proportion of pill/condom use (28.9%) and sterilization use (22.4%).

The contraceptive pattern among users with different education levels also varied: very high and rather constant proportions (ranging from 81.9% to 87.5%) of IUD use for all education groups; the higher educated had relatively higher proportions using pill or condom (increased from 9% for primary school or less to 16.3% for senior high and higher), and lower proportions with surgical contraception.

Urban-rural differentials, were very similar to differentials by education of women because women in rural areas have much lower educational levels than those who live in urban areas. The proportion using IUDs in rural areas was unrelated to the distance to family planning services. Regional differences in the pattern of contraceptive use are not striking. The North region had the lowest rate of IUD use and the highest rate of pill/condom use; while the South and Southwest regions had a slightly lower rate of pill/condom use and a slightly higher rate of IUD use.

Since the pattern of contraceptive use for one-child users was differentiated by age, education, and urban-rural residence, it is of interest to review how patterns differed by combined categories of age by education and by urban-rural residences. Table 4-9 shows these combined categories. With IUD as the dominant method used across all age groups by education categories, the proportion of pill/condom users was higher for women with higher education. For example, for the youngest 15-24 age group, the proportion using pill/condom increased from less then 9% for women with no education or primary school education to 22.0% for those with senior high and higher; while for the oldest 40-49 age group, the proportion consistently increased from 11% to 32%. Among older age groups, those who had less education had higher proportions of couples with sterilization.

Table 4-9 also shows that, for all age groups, the proportion of pill/condom users was consistently higher in urban areas than in rural areas. For sterilization, the proportion with surgical contraception in rural areas was almost four times higher than in urban areas for the oldest age group.

b. Contraceptive Methods Used by Couples with Two or More Children

Except for the ethnic minorities and some other exceptions (11), couples having two or more children exceed the family size promoted by the family planning policy. Therefore, this group has an extremely high rate of current contraceptive use (93.2%; refer to Table 4-6), and the great majority of the users were using the most effective methods. Table 4-10 shows that, of all users with two or more children, 61.9% of wives and 17.7% of husbands, or 79.6% of either wives or husbands, were sterilized; 17.4% were using IUDs and other methods accounted for only 3.0% of users.

The patterns of contraceptive use by age group were not very different, except that the youngest age group (15-24) had a lower proportion using male sterilization (13.8%) and a slightly higher use of IUDs (17.7%). The oldest age group had a somewhat lower proportion of female sterilization (55.1%) and a higher use of IUDs (24.4%). The pattern by education of women shows that those with higher education had a lower proportion using female sterilization and a higher proportion using IUDs and other methods.

Results by access to service and urban-rural differentials were very similar to differentials by education of women because the educational level of women in urban areas is much higher than those who live in rural areas. Therefore, rates of sterilizations were lower in urban areas (female 53.9%, male 8.3%) than in rural areas (female 62.9%, male 18.7%) and the proportion using IUDs and other methods were higher in urban areas than in rural areas. Within rural areas, the proportion of couples with female sterilization decreased with increasing distance to service points, but the proportion of male sterilization seems to be unrelated to distance.

The regional differences in contraceptive patterns, particularly in the distribution of female and male sterilization, as shown in Table 4-10, were dramatic. The proportion using female sterilization in the North, Northeast, South and Northwest regions (70.1%, 70.3%,68.6% and 68.3%) were exceedingly high, and male sterilization use (7.2%, 0.6%, 16.3% and 3.1%) was extremely low in 3 of the 4 regions; in contrast, in the Southwest region the proportion with female sterilization was the lowest (31.0%) and the male proportion was the highest (41.4%) of all regions. The differences in use of female and male sterilization by region also affects regional differences in the proportions of IUD use and other methods. The dramatic regional variations in the ratio of female sterilization (tubal-ligation) use to male sterilization (vasectomy) use prompt our further investigation of the ratio between vasectomy and tubal ligation and vasectomy users in the next section.

c. Vasectomy Versus Tubal-Ligation Use for All Couples with Surgical Contraception

Table 4-11 shows that 46.1% of all couples of child-bearing age reported either a vasectomy (10.2%) or tubal-ligation (35.9%). Thus, the overall ratio of tubal-ligation to vasectomy was 3.5 tubal ligations per each vasectomy. The ratio differs somewhat by number of children, age group, ethnicity and education of women. However, regional and urban-rural differentials are more substantial with the ratio significantly higher for couples in urban areas and in 3 of the 6 regions. The regional variation was striking in that the ratio in the South-West was less than 1.0 (0.8) compared with the ratio in the North-East of 108.0.

This dramatic regional variation in the ratio between vasectomies and tubal-ligations is generally hypothesized as a consequence of government policy since the provincial family planning authorities are given the programmatic responsibility to decide whether female or male sterilization is to be promoted in their province.

In conclusion, we would like to highlight the significant findings that relate to evaluating the progress and performance of the national family planning program. Policy implications and further research needs are also discussed.

- Contraceptive prevalence in China has increased 15 percentage points to 85% in the decade following the initiation of the new family planning policy, the highest level reported by any country in the world. Although the increase in the over-all rate of contraceptive practice for the first 6 years of the decade was minimal, the pace had rapidly accelerated during the last 4-year period. In fact, China had not realized more rapid socio-economic development until the latter half of the decade. This is consistent with the classical theory that socio-economic development provides favorable conditions for the prevalence of contraceptive practice and fertility decline. However, in rural areas, the increase in contraceptive prevalence is probably due to the extension and improvement of the program outside of the urban areas.

- During the past decade, the national family planning program has had considerable success in promoting contraceptive use among less receptive and hard-to-reach couples. Thus, the socio-demographic and regional differentials in contraceptive prevalence have been greatly reduced. In a developing society, younger and older, less educated, and rural women are less receptive to contraceptive practice. In addition, access to contraceptive services is more difficult for couples residing in remote rural areas. Therefore, in China in 1982 as well as in developing countries, there were substantial differentials in contraceptive prevalence by socio-demographic characteristics and geographic regions. However, in 1992, contraceptive differentials by urban-rural residence and most socio-demographic variables essentially disappeared.

- In addition to promoting contraceptive use, the national family planning program has supported the use of more effective contraceptive methods to replace less effective methods. Although the over-all rate of contraceptive use had very little increase in the period from 1982 to 1988, there was a 40% increase in couples using surgical contraception. From 1988 to 1992, the use of surgical contraception and IUDs, the two principal methods of the program, continued to increase accounting for the 13.5 percentage point increase in prevalence over that period of time.

- Cross-sectional analysis of 1992 survey data indicates that contraceptive prevalence was reflective of the Chinese family planning policy. The current policy stipulates a one-child family in urban areas, and two-children are encouraged in most of rural areas and for ethnic minorities (11). For couples with two or more children, either male or female sterilization is strongly encouraged. In response to the policy, the level of contraceptive use was extremely high for women with one or more children in urban areas and for women with two or more children in rural areas. However, the ethnic minorities had a lower rate of contraceptive use than the ethic majority in rural areas. The surgical contraception rate(male and female) for those who already had two or more children is probably the highest in the world.

- The rate of contraceptive use among married women who are childless was extremely low, especially in rural areas, reflecting the desire to have a child soon after marriage. However, the rate for higher educated childless-women in urban areas was higher, showing that there is a small segment of the population wanting to space their first child after marriage. Most of the childless married women in urban areas who use contraceptives for delaying their first birth are using reversible methods other than IUD. However, in rural areas, there is no relationship between education and contraceptive use among childless women. Whether or not less availability or accessibility to reversible methods other then the IUD in rural areas is their main reason for not using other reversible methods, it may have important program implications for further improvement of family planning services in rural areas.

- Even though couples in most rural areas are encouraged to have two children, there was a high rate of contraceptive use among one-child women in rural areas. Couples with two or more children in the whole country and one-child women in urban areas are less likely to have additional children due to their extremely high rates of contraceptive use. Therefore, the rate of contraceptive use among the great number of one-child women in rural areas, who are young and fecund, largely determines the level of fertility for the whole country. Moreover, the current low level of total fertility will continue if the contraceptive practice of the rural one-child women is due to their receptivity to the one-child family norms rather than to delaying their second births.

- With IUD as the prime method for one-child users, younger women with lower education, particularly in rural areas, have very limited alternative options for their contraceptive use. The overwhelming majority of one-child, younger, and lower-educated women have counted almost exclusively on the IUD. Since the IUD has been found to be less effective for younger women (5), the introduction of highly effective new methods, such as injectable and Norplant, is one of the challenges for the national family planning program.

- With a very high proportion of women with two or more children in remote rural areas using sterilization, safety and efficacy issues associated with sterilization should be studied. Female sterilizations in remote rural areas are performed in local hospitals with less than ideal facilities and providers may not have a great deal of experience. Past studies conducted in the United States (11) Colombia (7) and Brazil (8) found that rates of sterilization failure were higher than expected when studied over a 5-year period. Studies dealing with such issues in remote rural areas in China have never been reported. Such a study is recommended.

- With the significant regional variation seen in the ratio between vasectomy and tubal ligations, a study to determine the determinants of contraceptive choice, either vasectomy or tubal ligation, may have important family planning policy and program implications. One possible explanation is that the popularity of vasectomy in the Southwest region originated from Sichuan Province, where a Urologist developed a simple and effective technique of vasectomy. Numerous doctors were trained to use this technique in this region. Yet, such an explanation has never been documented.

  It has also been hypothesized that the choice of either vasectomy or tubal ligation is attributed to the role and status of women. Traditionally, rural wives rather than their husbands in the Southwest are responsible for heavy physical work and livelihood of their households. Therefore, the couples prefer vasectomy to avoid possible side effects associated with tubal ligation. A study conducted in Sichuan Province attempted to investigate that hypothesis (9). However, the results of the study were not conclusive because the study area was rather small and homogeneous and women's status in the area had small variability. Another study conducted in Sandong Province indicated that those couples who chose tubal ligations were better informed about tubal ligation than about vasectomy (10). However, this study was not appropriately designed for detecting reasons for method choice. Therefore, a study to investigate the reasons for choice of either vasectomy or tubal ligations would be very important for policy and program implications in improving China's current family planning program.

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(12) Current family planning policy stipulates one-child families in urban areas, and two-child families in rural areas and for any ethnic minorities. However, there are the following exceptions: Only one child is encouraged in rural areas of JiangSu Province and suburban counties of Chengdu City, Sichuan Province, due to their high population density.

Two children are allowed if:

a. the first child, or either husband and wife, is mentally or physically disabled.
b. the first child is adopted by an aunt or uncle.
c. last two generations, or both husband and wife, are from a one-child family.
d. either husband or wife remarried with one child.
e. family returned from overseas.
f. the father of either parent was a soldier killed on duty, or if the husband is a retired disabled soldier.
g. either husband or wife is one of the following: underground worker, coal miner, engaged in animal husbandry or forestry in remote areas or ocean fishery or work in offshore areas or areas with local diseases.

Three or more children are allowed for a very limited number of couples who meet certain specific conditions.

Table 4-1
Percentage of Women Currently Using Contraception by Selected Variables, Ever Married Women Aged 15-49 years of age, China 1982, 1988, and 1992

Selected Variable	Percent of Women Currently Using Contraception: 1982 (a)	1988 (b)	1992 (c)	Percentage Point Difference between: 82-88 (b-a)	88-92 (c-b)	82-92 (c-a)
Total	69.5%	71.1%	84.6%	+1.6%	+13.5%	+15.1%
(n)	(172,788)	(406,387)	(73,946)			
Age of Women						
15-19	10.0	11.2	29.1	1.2	17.9	19.1
20-24	30.5	38.1	54.7	7.6	16.6	24.2
25-29	68.2	70.6	84.8	2.4	14.2	16.6
30-34	87.5	87.5	93.4	0.0	5.9	5.9
35-39	89.0	91.4	95.7	2.4	3.3	6.7
40-44	82.0	84.4	94.4	2.4	10.0	12.4
45-49	52.9	51.9	80.8	-1.0	28.9	27.9
Number of Children						
0	2.4	4.0	5.4	1.6	1.4	3.0
1	66.0	71.2	85.5	5.2	14.3	19.5
2	82.4	84.8	93.9	2.4	9.1	11.5
3	85.0	86.0	94.1	1.0	8.1	9.1
4	81.6	79.9	91.4	-1.7	11.5	9.8
5+	70.9	67.4	86.3	-3.5	18.9	15.4
Education of Women						
Primary or less	70.3	70.9	85.3	0.6	14.4	15.0
High school level	57.6	68.8	83.8	11.2	15.0	26.2
College or higher	80.4	73.4	78.9	-7.0	5.5	-1.5
Ethnicity						
Han Majority	-	72.4	85.6	-	13.2	-
Minorities	-	55.6	72.4	-	16.8	-
Urban-Rural Residence						
Urban Areas	74.6	76.6	84.8	2.4	8.2	10.2
Rural Areas	68.6	69.7	84.5	1.1	14.8	15.9
Regions						
North	71.0	73.3	84.1	2.3	10.8	13.1
North East	77.2	78.0	87.5	0.8	9.5	10.3
East	73.0	66.0	86.7	-7.0	20.7	13.7
South	65.3	67.6	85.5	2.3	17.9	20.2
South West	68.1	47.5	80.4	-20.6	32.9	12.3
North West	60.6	59.7	77.0	-0.9	17.3	16.4

Data Sources:
a. Reference (3) b. Reference (2) c. Current study.

Table 4-2
Current Contraceptive Status and Specific Method Used
Ever Married Women Aged 15-49, China
1982, 1988, and 1992

(Percentage Distribution)

Current Status and Method of Contraception	Survey Conducted in the Year of: 1982 (a)	1988 (b)	1992 (c)	Percentage Difference between: 82-88 (b-a)	88-92 (c-d)
Using a Method	69.5%	71.1%	84.6%	+1.6%	+13.5%
Sterilization	24.5	35.0	46.1	+10.5	+11.1
Female	17.6%	27.2%	35.9%	+9.6%	+8.7%
Male	6.9	7.8	10.2	+0.9	+2.4
IUD	34.9	29.5	33.1	-5.4	+3.6
Oral Pill	5.9	3.5	3.1	-2.4	-0.4
Condom	1.4	1.9	1.4	+0.5	-0.5
Others	2.8	1.2	0.7	-1.6	-0.3
Not Using Method	30.5%	28.9%	15.4%	-1.6	-13.5
Total	100.0%	100.0%	100.0%		
(n)	(172,788)	(406,387)	(73,946)		

Data Sources:

a. Refer to Section 8: Reference (1).
b. Refer to Section 8: Reference (2).

Table 4-3
Percent of Women Currently Using Contraception by Selected Variables by Ethnicity, Ever Married Women Aged 15-49
1992 Chinese National Family Planning Survey

Selected Variable	Total (n)	Ethnicity of Women: Han Ethnicity	Ethnicity of Women: Minorities
Total	84.6% (73946)	85.6% (69103)	69.9% (4843)
Number of Children			
0	5.4 (5207)	5.7 (4771)	3.0 (436)
1	85.5 (23519)	86.9 (22572)	53.0 (947)
2+	93.2 (45220)	94.2 (41760)	83.0 (3460)
Age of Women			
15-24	53.6 (11045)	55.4 (10042)	36.1 (1003)
25-29	84.8 (18184)	85.8 (16958)	71.7 (1226)
30-34	93.4 (11450)	93.9 (10842)	84.5 (608)
35-39	95.7 (13842)	96.0 (13096)	91.4 (746)
40-44	94.4 (11326)	95.0 (10653)	85.1 (673)
45-49	80.8 (8099)	82.1 (7512)	64.1 (587)
Education of Women			
None	85.8 (20000)	88.1 (17827)	67.1 (2173)
Primary	85.0 (25432)	86.0 (23733)	71.0 (1699)
Junior high	82.9 (19836)	83.2 (19061)	73.7 (775)
Senior high +	84.4 (8678)	84.6 (8482)	77.6 (196)
Access to Service			
Urban Areas	84.8 (14544)	85.0 (14262)	75.5 (282)
Rural Areas:	84.5 (59402)	85.7 (54841)	69.6 (4561)
< 1 km	85.7 (19788)	86.1 (19210)	72.4 (578)
1 - 4 km	85.0 (29131)	86.0 (27204)	70.9 (1927)
5 - 9 km	82.1 (7989)	84.3 (6944)	67.4 (1045)
> 10 km	76.5 (2494)	82.8 (1483)	67.4 (1011)
Regions			
North	84.1 (9196)	84.2 (8823)	80.7 (337)
North East	87.5 (7093)	87.6 (6826)	84.3 (267)
East	86.7 (26355)	86.7 (26207)	89.2 (148)
South	85.5 (14780)	86.2 (13724)	77.1 (1056)
South West	80.4 (10961)	83.3 (9013)	67.5 (1948)
North West	77.0 (5597)	81.6 (4510)	57.9 (1087)

Note: (1) Numbers of women are given in the parentheses on which the rate is based.
(2) The total rates for urban-rural residence, education of women, number of children, and the grand-total are shown on tables 3 and 4.

Table 4-4
Percent of Women Currently Using Contraception by Selected Variables by Number of Children, Ever Married Women Aged 15-49
1992 Chinese National Family Planning Survey

Selected Variable	Number of Children at Time of Interview: None	One	Two or more
Total	5.4% (5207)	85.5% (23519)	93.2% (45220)
Age of Women			
15-24	5.4 (3385)	73.3 (6082)	81.5 (1578)
25-29	5.7 (1113)	87.9 (8890)	92.2 (8181)
30-34	7.8 (218)	92.3 (3889)	96.5 (7343)
35-39	5.3 (190)	94.3 (3223)	97.8 (10429)
40-44	4.6 (110)	90.4 (1111)	95.9 (10105)
45-49	2.6 (191)	62.0 (324)	83.5 (7584)
Education of Women			
None	2.7 (916)	74.2 (2701)	92.3 (16383)
Primary	3.7 (1663)	82.1 (6456)	93.8 (17313)
Junior H.	5.1 (1769)	87.7 (9150)	93.3 (8917)
Senior H.+	12.2 (859)	91.7 (5212)	93.6 (2607)
Access to Service			
Urban Areas	12.5 (1199)	91.7 (8626)	90.4 (4719)
Rural Areas:	3.4 (4008)	81.9 (14893)	93.7 (40501)
< 1 km	3.9 (1299)	85.1 (5443)	94.1 (13046)
1- 4 km	3.2 (1937)	82.2 (7306)	94.5 (19888)
5- 9 km	2.2 (541)	74.3 (1652)	91.8 (5796)
> 10 km	4.3 (231)	67.5 (492)	88.5 (1771)
Regions			
North	6.3 (696)	86.1 (2726)	92.6 (5738)
North East	8.0 (551)	92.4 (3189)	95.9 (3353)
East	4.7 (1710)	89.0 (9237)	94.5 (15408)
South	4.2 (896)	80.1 (3458)	94.2 (10426)
South West	5.8 (873)	80.0 (3473)	90.5 (6615)
North West	5.2 (481)	71.9 (1436)	88.3 (3680)

Note: (1) Numbers of women are given in the parentheses on which the rate is based.
(2) The total rates for urban-rural residence, education of women, number of children, and the grand-total are shown on tables 3 and 4.

Table 4-5
Percent of Women Currently Using Contraception by Education of Women and by Rural-Urban Residence by Number of Children
All Ever Married Women Aged 15-49
1992 Chinese National Family Planning Survey

Urban-Rural Residence & Education of Women	Number of Children at Time of Interview: None	One	Two or more
Urban Areas:			
Primary or Less	6.5 (107)	87.9 (752)	89.6 (2024)
Junior High	10.5 (420)	91.4 (3594)	90.8 (1673)
Senior High +	14.7 (665)	92.6 (4211)	91.3 (969)
Rural Areas:			
Primary or less	3.2 (2472)	79.0 (8405)	93.3 (31672)
Junior High	3.5 (1349)	85.4 (5556)	93.9 (7244)
Senior High +	3.6 (194)	87.9 (1001)	94.9 (1638)

Note (1) Numbers of women are given in parentheses.
(2) The total rates for urban-rural residence, education of women, number of children, and the grand-total are shown on tables 3 and 4.

Table 4-6
Contraceptive Method Currently Used by Number of Children
Ever Married Women Aged 15-49
1992 Chinese National Family Planning Survey
(Percent Distribution)

Contraceptive Method Currently Using	Total Number of Living Children: 0	1	2+	Total
Using a Method	5.4%	85.5%	93.2%	84.6%
Sterilization	0.5	2.6	74.1	46.1
Female	0.3%	2.0%	57.7%	35.9%
Male	0.2	0.6	16.4	10.2
IUD	1.2	72.6	16.3	33.1
Oral Pill	1.4	5.6	2.0	3.1
Condom	1.9	3.4	0.4	1.4
Others	0.4	1.3	0.4	0.9
Not Using Method	94.6%	14.5%	6.8%	15.4%
Total	100.0%	100.0%	100.0%	100.0%
(n)	(5207)	(23519)	(45220)	(73946)

Table 4-7
Contraceptive Users by Selected Variables
Ever Married Women Aged 15-49
1992 Chinese National Family Planning Survey
(Percent Distribution)

Variables	Contraceptive Methods Currently Used: Sterilization (a)	IUD	Other Methods (b)	Total Users (n)
Total	54.6%	12.1%	6.2%	100.0% (62524)
Number of Children				
0	8.5	21.9	69.6	100.0 (283)
1	2.9	85.0	12.1	100.0 (20107)
2+	79.6	17.4	3.0	100.0 (42134)
Age of Women				
15-24	17.5	72.2	10.3	100.0 (5924)
25-29	41.2	51.9	6.9	100.0 (15423)
30-34	56.0	38.1	5.9	100.0 (10691)
35-39	65.4	29.3	5.3	100.0 (13248)
40-44	70.5	24.3	5.2	100.0 (10696)
45-49	69.9	25.1	5.0	100.0 (6542)
Education of Women				
None	73.8	22.9	3.3	100.0 (17154)
Primary	60.6	34.9	4.5	100.0 (21608)
Junior high	39.9	51.9	8.3	100.0 (16438)
Senior high +	25.2	61.2	13.7	100.0 (7324)
Access to Service				
Urban Areas	22.9	62.5	14.6	100.0 (12328)
Rural Areas:	64.4	33.4	4.2	100.0 (50196)
< 1 km	60.5	35.4	4.1	100.0 (16954)
1 - 4 km	62.8	32.9	4.3	100.0 (24773)
5 - 9 km	66.5	30.0	3.5	100.0 (6560)
> 10 km	60.6	33.9	5.6	100.0 (1909)
Regions				
North	54.2	35.8	10.0	100.0 (7702)
North East	37.3	56.3	6.3	100.0 (6205)
East	54.1	39.3	6.6	100.0 (22852)
South	67.0	29.8	3.2	100.0 (12641)
South West	50.6	44.3	5.1	100.0 (8817)
North West	55.0	36.2	8.7	100.0 (4307)

(a) Includes both male and female sterilization.
(b) Using other reversible methods; mainly the pill or condom.

Table 4-8
Contraceptive Users with One Child by Selected Variables
Ever Married Women Aged 15-49, 1992 Chinese National Family Planning Survey
(Percent Distribution)

	Contraceptive Methods Currently Used:				
	Sterilization**	IUD	Other Method*	Total Users	(n)
Total	2.9%	85.0%	12.1%	100.0%	(20107)
Age of Women					
15-24	0.6%	89.9%	9.5%	100.0%	(4455)
25-29	1.6	87.8	10.6	100.0	(7818)
30-34	2.6	84.8	12.6	100.0	(3589)
35-39	6.1	79.0	14.8	100.0	(3040)
40-44	11.3	66.5	22.2	100.0	(1004)
45-49	22.4	48.8	28.9	100.0	(201)
Education of Women					
None	9.0	82.2	8.8	100.0	(2003)
Primary	3.3	87.5	9.1	100.0	(5299)
Junior high	1.8	85.8	12.3	100.0	(8026)
Senior high +	1.8	81.9	16.3	100.0	(4779)
Access to Service					
Urban Areas	2.1	81.1	16.8	100.0	(7910)
Rural Areas:	3.5	87.5	9.0	100.0	(12197)
< 1 km	2.9	87.6	9.5	100.0	(4630)
1 - 5 km	3.5	87.7	8.8	100.0	(6007)
5 - 10 km	6.1	85.6	8.3	100.0	(1228)
> 10 km	3.3	88.3	8.4	100.0	(332)
Regions					
North	2.9	78.1	19.0	100.0	(2346)
North East	1.2	88.8	10.0	100.0	(2946)
East	2.5	84.4	13.1	100.0	(8217)
South	4.3	86.4	9.3	100.0	(2787)
South West	4.4	87.5	8.1	100.0	(2778)
North West	4.5	83.2	12.4	100.0	(1033)

* Same foot note as table 4-7.
** Includes both male and female sterilizations.

Table 4-9
Contraceptive Users with One Child by
Age and Education and by Age and Residence
1992 Chinese National Family Planning Survey
(Percent Distribution)

Combined Categories	Composition of Methods Currently Using: Sterilization**	IUD	Other Methods*	Total	Users (n)
Age by Education of Women					
15-24: None	0.5	91.3	8.2	100.0	(585)
Primary	0.6	92.1	7.3	100.0	(1941)
Junior High	0.6	88.6	10.8	100.0	(1715)
Senior H+	0.5	77.6	22.0	100.0	(214)
25-29: None	5.3	87.5	7.2	100.0	(583)
Primary	2.0	90.5	7.6	100.0	(1929)
Junior High	1.3	88.5	10.2	100.0	(3557)
Senior H+	0.7	83.6	15.7	100.0	(1749)
30-39: None	14.2	75.6	10.2	100.0	(669)
Primary	5.8	81.1	13.1	100.0	(1169)
Junior High	2.5	83.3	14.2	100.0	(2287)
Senior H+	2.3	83.4	14.3	100.0	(2504)
40-49: None	30.7	58.4	10.8	100.0	(166)
Primary	22.7	60.4	16.9	100.0	(260)
Junior High	6.6	68.1	25.3	100.0	(467)
Senior H+	5.4	62.2	32.4	100.0	(312)
Age by Urban-Rural Residence					
15-24: Urban	0.4	79.0	20.6	100.0	(501)
Rural	0.6	91.3	8.0	100.0	(3954)
25-29: Urban	0.6	83.8	15.6	100.0	(2560)
Rural	2.1	89.8	8.1	100.0	(5258)
30-39: Urban	2.2	82.9	14.9	100.0	(4020)
Rural	7.3	81.0	11.7	100.0	(2609)
40-49: Urban	7.0	65.3	27.7	100.0	(829)
Rural	26.6	59.8	13.6	100.0	(376)

Note: Refer to Table 8 for the grand total and sub-totals.
* Includes mainly the pill or condom with a negligible number of other methods.
** Includes both male and female sterilizations.

Table 4-10
Contraceptive Users with 2 or More Children
by Selected Variables, Even Married Women Aged 15-49,
1992 Chinese National Family Planning Survey

(Percent Distribution)

Variables	Sterilization: Female	Male	IUD	Others*	All Users (n)
Total	61.9%	17.7%	17.4%	3.0%	100.0% (42134)
Age of Women					
15-24	64.1	13.8	17.7	4.4	100.0 (1286)
25-29	63.2	19.3	15.0	2.6	100.0 (7542)
30-34	65.4	17.8	14.4	2.4	100.0 (7085)
35-39	64.8	18.3	14.4	2.4	100.0 (10198)
40-44	59.6	17.0	19.9	3.4	100.0 (9687)
45-49	55.1	16.3	24.4	4.2	100.0 (6336)
Education of Women					
None	62.1	20.4	15.1	2.4	100.0 (15126)
Primary	62.8	16.6	17.7	2.8	100.0 (16247)
Junior high	61.6	15.4	19.3	3.7	100.0 (8321)
Senior high+	56.7	15.2	22.5	5.7	100.0 (2440)
Access to Service					
Urban Areas	53.9	8.3	29.4	8.4	100.0 (4268)
Rural Areas:	62.9	18.7	16.0	2.6	100.0 (37866)
< 1 km	67.2	15.3	15.7	1.8	100.0 (12274)
1 - 4 km	62.2	19.7	15.4	2.7	100.0 (18705)
5 - 9 km	57.2	23.3	17.2	2.3	100.0 (5320)
> 10 km	55.3	17.7	22.3	7.7	100.0 (1567)
Regions					
North	70.1	7.2	17.3	5.3	100.0 (5312)
North East	70.3	0.6	26.9	2.3	100.0 (3215)
East	63.9	19.6	14.0	2.5	100.0 (14554)
South	68.6	16.3	13.8	1.2	100.0 (9816)
South West	31.0	41.4	24.2	3.4	100.0 (5988)
North West	68.3	3.1	21.5	7.0	100.0 (3249)

* Includes mainly pill and condom.

Table 4-11
Rates of Male Female and Sterilizations and Female/Male Ratio of Sterilization by Selected Variables for All Couples
1992 Chinese National Family Planning Survey

Variables	Number of Ever Married Women*	Rate of Sterilization: All	Male (a)	Female (b)	Ratio of Female Sterilization per 100 Male Sterilizations (n)** (b)/(a)
Total	(73946)	46.1%	10.2%	35.9%	3.5 (26575)
Number of Children					
0 - 1	(28726)	2.2	0.5	1.7	3.4 (475)
2	(24144)	72.6	14.6	58.0	4.0 (14003)
3+	(21076)	76.0	18.6	57.4	3.1 (12097)
Age of Women					
15-24	(11045)	9.4	1.7	7.7	4.5 (845)
25-29	(18184)	34.9	8.2	26.7	3.3 (4861)
30-34	(11450)	52.4	11.2	41.2	3.7 (4713)
35-39	(13842)	62.7	13.8	48.9	3.5 (6763)
40-44	(11326)	66.5	14.7	51.8	3.5 (5867)
45-49	(8099)	56.4	12.9	43.5	3.4 (3526)
Education of Women					
None	(20000)	63.3	15.7	47.6	3.0 (9524)
Primary	(25432)	51.5	10.8	40.7	3.8 (10352)
Junior high	(19836)	33.0	6.6	26.4	4.0 (5240)
Senior high +	(8678)	21.2	4.4	16.8	3.8 (1459)
Ethnicity					
Ethnic Han	(69103)	46.9	10.3	36.6	3.6 (25321)
Minorities	(4843)	35.9	10.0	25.9	2.6 (1254)
Access to Service					
Urban Areas	(14544)	19.5	2.6	16.8	6.5 (2445)
Rural Areas:	(59402)	52.7	12.1	40.6	3.4 (24130)
< 1 km	(19788)	51.8	9.6	42.2	4.4 (8353)
1 - 4 km	(29131)	53.4	12.9	40.5	3.1 (11799)
5 - 9 km	(7989)	54.6	15.8	38.8	2.5 (3102)
> 10 km	(2494)	46.3	11.2	35.1	3.1 (876)
Regions					
North	(9160)	45.6	4.2	41.4	9.9 (3790)
North East	(7093)	32.7	0.3	32.4	108.0 (2296)
East	(26355)	46.9	11.0	35.9	3.3 (9469)
South	(14780)	57.3	11.0	46.3	4.2 (6842)
South West	(10961)	40.7	23.2	17.5	0.8 (1916)
North West	(5597)	42.3	1.9	40.4	21.3 (2262)

* Number of couples on which the rates are based.
** Number of female sterilizations on which the ratio is based.

Chapter 5

Non-Use of Contraception among Chinese Women

Yunrong Liu and Yan Liu

The 1992 national family planning survey revealed that 83.4 percent of ever-married women under age 50 were practicing contraception and 16.6 percent were not using any form of contraception[1]. Chapter 4 focuses on the methods used by women who practiced contraception. This chapter looks at women who were not using contraception. We first examine variations in nonuse among the country's 30 provinces and municipalities. Then we consider the influence of age, number of living children, and education on women in rural areas and those in urban areas. We also consider the relationship between access to various public services and nonuse by women in rural areas. Finally, we discuss the implications of some of the findings.

Variation among Provinces

Table 5-1 shows that, for the whole nation, about 1 out of 6 ever-married women 15-49 years of age (16.6%) were not using contraception in 1992; a decrease of 12.3 percentage points from the previous national survey in 1988 when 28.9% were non-users. In rural areas, 16.7 percent of ever-married women under age 50 were not using contraception at the time of the survey; in urban areas, 16.2 percent were nonusers. The similarity between women in rural areas and those in urban areas implies that access to family planning services and receptivity to contraception were similar for the two groups of women. Tibet had the highest percentage of women not using contraception, followed by Xinjiang and Hainan. This finding is understandable because these provinces have sizable minority populations and more rural areas than urban areas, and the national family planning policy allows ethnic minority couples and couples living in most rural areas to have two (or more) children. By contrast, Beijing had the smallest percentage of nonusers, followed by Jiangsu; Jilin, Jiangxi, Shandong and Shanghai.

Differences among Sociodemographic Groups

As one would expect, both countrywide and by residential area, younger women were more likely than older women to have chosen not to use contraception because they were either pregnant or trying to become pregnant or breast-feeding (table 5-2). Countrywide, the youngest group of women had the highest percentage of nonusers. Because there were more infertile women in the oldest age group, this group had a larger percentage of nonusers than the women between 25 and 49 years of age.

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[1] The contraceptive use rate in Chapter 4 was 84.6% based on the de-facto population only. The contraceptive use rate used in this chapter is 83.4% because it includes the de-jure population as well as the defacto population. No adjustment for this negligible 1.2 percentage point difference has been made here.

In both rural and urban areas, high proportions of women in the two youngest age groups gave breast feeding as the reason they were not using contraception. Nationwide, 13.0 percent of the women in the youngest age group said they were not using contraceptives because they were breast feeding; in the 20–24 age group, the figure was 11.0 percent Among teenagers, breast-feeding was twice as high among rural women than urban women. A relatively high proportion of women in the youngest age group did not specify the reason why they were not using contraceptives.

A high percentage of childless women, in both rural and urban areas, were not practicing contraception (table 5-3). Ninety-six percent of childless women living in rural areas were not using contraceptives, compared with 87 percent in urban areas and 94 percent nationwide. These childless women stated that they were not using contraception because they were pregnant or were trying to become pregnant reflecting the fact that they were very young women.

Once a woman had a child, she was, understandably, much more likely to use contraception. The percentage of nonusers dropped dramatically among women with one child. In rural and urban areas, the percentage of nonusers among this group dropped from 96 to 18 percent and 87 to 9 percent, respectively; the proportion of nonusers dropped still further among women with two children and then began a slight upward trend as the number of children—and the women's ages—increased. By the time women had five or more children, the percentage of nonusers of contraceptives reached close to 16 percent for both the country as a whole and for rural areas and about 25 percent for urban areas.

Childless women in both rural and urban areas for the most part said they did not use contraceptives because they wanted to become pregnant, were currently pregnant, or were infertile. Women with one child most often reported that breast feeding was the reason they were not using contraception. The few non-users with two children who lived in rural areas generally cited breast feeding, and those in urban areas cited infertility most often. In both rural and urban areas, nonusers with more than two children most frequently gave infertility as the reason they did not practice contraception.

In both rural and urban areas, women who had attained the highest levels of education were more likely to be nonusers of contraception than were less-educated women (table 5-4). The majority of the women in the two most highly educated groups were not using contraceptives because they wanted to become pregnant, were pregnant, or were breast feeding. This implies that larger proportions of more highly educated women did not use contraception because they were younger, not because of their higher educational status.

Access of Rural Women to Family Planning Services

We considered access to family planning services because difficulty obtaining contraceptive supplies and services affects acceptance of contraceptives and continued use by women in rural areas. Nonuse of contraception seemed only slightly related to access to a county government (table 5-5). The percentage of nonusers increased from 13.0 percent among women who lived within 1 kilometer of a county government to 16.5 percent among women who lived 1–4 kilometers from a county government. The differences in the percentages were negligible and inconsistent at

distances greater than 5–9 kilometers. By contrast, access to public transportation, a family planning clinic, and a public health clinic had a significant effect on contraceptive use among women who lived farther than 9 kilometers from any of these services. For example, women who lived 50 or more kilometers from public transportation were more than twice as likely to be nonusers as those who lived 1–4 kilometers from public transportation. Women who lived more than 49 kilometers from a public health clinic were almost three times as likely not to use contraception as those who lived within 1 kilometer.

Conclusion

The survey showed considerable variation in contraceptive use among women in the country's 30 provinces and municipalities. The proportions of women in the northwestern and southwestern provinces who were not using contraception were much greater than those elsewhere. Women in these areas are more likely to belong to a minority group or live in rural areas and/or women in these two regions are for some reason less receptive to contraception, or family planning services in these areas are in need of improvement, or both. An understanding of the reasons for variations among regions would provide the basis for improvements to the family planning program.

The survey also revealed that higher proportions of women aged 15 to 24 years in both rural and urban areas were not using contraception because they were breast feeding. These women might believe that breast feeding prevents conception. If so, their reasons for holding this belief and the advice that the family planning program provides to women about contraception during breast feeding should be explored.

Among the youngest age group, a high percentage reporting nonuse of contraception did not specify a reason. Some, particularly those in rural areas, might have lacked access to family planning services and other sources of information on contraception. In future surveys, more attention should be given to the capture and coding of reasons for not using contraception.

The inter-uterine device (IUD) is the method of contraception most frequently used in rural areas (see chapter 4). Younger women may not use this method as effectively as older women, since younger users had higher expulsion and pregnancy rates than older users (Lo, Wong, and Wang, 1993). Thus, rural young women might stop using contraception at higher rates than older women, a pattern that may have contributed to a high proportion of nonusers who did not specify their reason for not using contraception.

Finally, a high percentage of women in remote rural areas where public transportation is poor and family planning services are inaccessible do not use contraception and thus risk unplanned pregnancies. Providing cost-effective family planning services to these women is one of the important challenges facing the national family planning program.

References

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Table 5-1. Percentage of ever-married women under age 50 not using contraception by residential area by province/municipality

Province or municipality by region	Total	Rural areas	Urban areas
Total	16.6	16.7	16.2
North			
Beijing	11.9	11.5	11.2
Tianjin	15.9	15.0	18.8
Hebei	15.3	14.8	22.5
Shanxi	22.1	22.4	15.0
Inner Mongolia	19.7	18.3	22.1
Northeast			
Liaoning	13.0	12.8	13.3
Jilin	12.3	12.2	12.9
Helongjiang	14.5	15.4	13.6
East			
Shanghai	13.0	9.8	14.6
Jiangsu	12.1	11.3	15.3
Zhejiang	13.9	14.0	13.8
Anhui	15.7	15.4	17.5
Fujian	14.8	15.0	13.6
Jiangxi	12.3	12.3	12.4
Shandong	12.3	12.4	11.0
South			
Henan	15.5	15.7	14.0
Hubei	18.5	17.8	19.9
Hunan	12.8	12.5	14.8
Guangdong	16.9	18.5	12.9
Guangxi	22.4	22.7	19.1
Hainan	32.9	35.5	19.1
Southwest			
Sichuan	17.2	16.8	19.7
Guizhou	20.7	20.8	20.2
Yunnan	27.6	28.9	22.4
Tibet	52.9	54.0	45.0
Northwest			
Shaanxi	17.7	17.7	17.1
Gansu	24.2	24.9	21.6
Qinghai	28.2	28.7	24.4
Ningxia	16.6	19.4	9.3
Xinjiang	39.6	43.8	26.9

Table 5-2. Percentage of ever-married women under age 50 not using contraception by age group by reason

Reason	Total	Age group (years)						
		15–19	20–24	25–29	30–34	35–39	40–44	45–49
Countrywide								
Total	16.6	72.2	46.2	15.7	7.0	4.5	5.8	20.4
Want to become pregnant	4.6	24.5	19.1	4.4	1.2	0.3	0.1	0.0
Pregnant	2.2	9.9	8.6	2.4	0.7	0.2	0.0	0.0
Breast feeding	3.0	13.0	11.0	3.8	0.9	0.3	0.1	0.0
Infertile	2.5	0.3	0.5	0.9	1.3	1.5	2.6	12.6
Husband away	1.1	1.3	0.9	0.7	0.9	0.7	1.4	2.4
Other	3.3	23.2	6.0	3.5	1.9	1.5	1.6	5.3
Rural areas								
Total	16.7	72.0	45.0	15.3	7.0	4.2	5.5	19.3
Want to become pregnant	4.7	24.7	18.8	4.1	1.3	0.3	0.1	0.1
Pregnant	2.1	9.6	7.9	2.3	0.7	0.2	0.0	0.0
Breast feeding	3.0	12.7	10.8	3.5	0.9	0.3	0.1	0.0
Infertile	2.3	0.3	0.5	1.0	1.3	1.4	2.5	11.9
Husband away	0.9	1.2	0.9	0.6	0.6	0.4	1.2	2.2
Other	3.5	23.8	6.1	3.8	2.2	1.5	1.6	5.0
Urban areas								
Total	16.2	77.8	53.8	17.7	7.1	5.4	6.8	25.1
Want to become pregnant	4.0	16.7	21.4	5.8	1.1	0.3	0.1	0.0
Pregnant	2.2	22.3	12.9	2.8	0.8	0.2	0.0	0.0
Breast feeding	2.7	22.2	12.2	4.7	0.9	0.2	0.0	0.1
Infertile	2.8	0.0	0.2	0.9	1.3	1.5	2.8	15.4
Husband away	1.9	5.6	1.3	1.4	1.9	2.0	2.2	3.2
Other	2.6	11.1	5.8	2.1	1.2	1.3	1.7	6.4

Table 5-3. Percentage of ever- married women under age 50 not using contraception by number of children by reason

Reason	Number of children					
	0	1	2	3	4	5+
Countrywide						
Total	94.2	14.8	6.3	6.0	8.7	16.3
Want to become pregnant	51.0	1.4	0.1	0.0	0.0	0.0
Pregnant	21.0	1.2	0.2	0.2	0.0	0.0
Breast feeding	0.0	6.6	2.0	0.7	0.5	0.4
Infertile	10.6	0.7	1.1	2.5	4.8	7.4
Husband away	1.6	1.2	0.7	0.9	1.3	1.7
Other	10.1	3.6	2.2	1.7	2.0	6.7
Rural areas						
Total	96.4	18.4	6.0	6.3	8.4	15.9
Want to become pregnant	53.7	2.1	0.1	0.0	0.0	0.0
Pregnant	29.5	1.8	0.2	0.2	0.0	0.0
Breast feeding	0.0	8.1	2.1	0.7	0.5	0.4
Infertile	10.9	0.8	0.8	2.1	4.6	7.2
Husband away	1.3	0.9	0.6	0.9	1.3	1.6
Other	10.0	4.7	2.3	1.7	1.9	6.6
Urban areas						
Total	87.1	8.6	8.0	11.6	13.1	24.6
Want to become pregnant	41.7	0.2	0.0	0.0	0.0	0.0
Pregnant	22.7	0.2	0.1	0.0	0.0	0.0
Breast feeding	0.1	4.1	1.1	0.4	0.0	0.0
Infertile	9.7	0.7	3.3	7.8	8.3	14.6
Husband away	2.4	1.8	1.8	1.8	2.0	5.5
Other	10.4	1.6	1.8	1.6	2.9	7.3

Table 5-4. Percentage of ever- married women under age 50 not using contraception by educational attainment by reason

Reason	None	Education				Post-High School	
		Adult Literacy Program	Primary school	Junior high school	High school	Vocational school	College or higher
Countrywide							
Total	15.3	13.1	16.4	18.4	14.9	20.4	24.1
Want to become pregnant	2.7	3.0	4.5	6.0	4.8	5.6	7.4
Pregnant	0.6	0.6	1.1	1.8	1.6	2.0	4.4
Breast feeding	2.1	1.5	3.0	3.9	2.5	3.0	4.7
Infertile	4.0	2.9	2.3	1.6	1.5	3.8	2.9
Husband away	1.3	1.1	0.9	1.0	1.2	1.6	2.0
Other	4.2	3.5	3.6	2.8	2.1	2.8	2.5
Rural areas							
Total	15.3	13.1	16.6	19.5	14.6	25.3	29.7
Want to become pregnant	2.7	3.1	4.8	6.8	5.0	10.4	10.9
Pregnant	1.6	1.8	3.2	5.0	3.7	3.1	7.8
Breast feeding	2.1	1.6	3.2	4.2	2.6	3.9	3.1
Infertile	4.0	2.7	2.0	1.3	1.4	3.2	4.7
Husband away	1.2	1.1	0.7	0.7	0.6	1.3	1.6
Other	4.2	3.4	3.6	3.0	2.3	3.9	1.6
Urban areas							
Total	15.3	14.5	14.2	15.7	15.1	19.9	23.7
Want to become pregnant	1.0	0.0	1.5	4.0	4.7	5.1	7.2
Pregnant	0.5	0.0	1.0	2.1	2.6	3.7	4.2
Breast feeding	1.7	0.6	1.3	3.1	2.4	2.9	4.8
Infertile	5.1	6.1	4.6	2.4	1.7	3.9	2.8
Husband away	2.5	2.4	2.1	1.9	1.7	1.7	2.0
Other	4.4	5.5	3.7	2.2	2.0	2.7	2.6

Table 5-5. Percentage of ever-married rural women under age 50 not using contraception by distance to selected public services

Service	Distance (kilometers)				
	< 1	1–4	5–9	10–49	50+
County government	13.0	16.5	17.3	16.4	18.3
Public transportation	16.5	15.5	18.6	24.4	32.6
Family planning clinic	15.0	15.3	17.0	18.7	23.1
Public health clinic	15.5	16.1	19.1	24.7	42.5

Chapter 6

Sex Preference and Its Effects on Fertility in China

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Sex preference has been prevalent in many countries of the world, especially in Asia. The form and extent of sex preference vary from one society to another. When production was at low levels, males, with greater labor force participation, were valued and respected by both family and society. So the male preference has a long cultural history in many countries. However, this culture of male preference has been weakening with socioeconomic development. There is little sex preference in the developed countries now (Arnold, 1986), and there is even girl preference in some countries of Europe. No obvious son preference exists in Latin American countries. Son preference is prevalent in some countries of East and South Asia and the territories of Chinese culture. It is found, however, that major fertility declines have been recorded in such countries or regions as Japan, South Korea, Singapore, Taiwan and Hong Kong. Indeed, there are many factors that may affect the fertility of women, among which are economic and cultural factors, urbanization, and family planning programs. Nevertheless, the questions whether sex preference would affect the childbearing behavior of women or would hamper further fertility decline have been central concerns in recent years.

China has had a traditional culture of male preference for thousands of years. Males have been regarded as playing the major role in carrying on the family name, labor participation and old-age security, so parents tend to value sons over daughters. This traditional culture has been gradually weakening with the radical social changes in China over the past 50 years, however, it cannot be fully eradicated in such a short period of time. Son preference is still common in many parts of China, especially in rural areas where the levels of socioeconomic development and urbanization are relatively low.

Demographic consequences of son preference have been demonstrated in recent studies. Typical examples of the consequences are that the sex difference in child mortality has deviated from the normal pattern of higher male mortality (Hao et al., 1994); the sex ratio of males to females at birth has been increasing (Zeng et al., 1993); and that at all parities above two, the sex ratios at the next birth for women with few or no sons are higher than those with many sons(Gao, 1993). The influences of son preference on fertility motives and behavior are also reflected by the following facts. It has been found in China that women whose first children are boys are more likely to receive one- child certificates than women whose first children are girls; and that at all parities, women with few or no sons are less

likely to be using contraceptives than those with many sons (Arnold and Liu, 1986). Also, the probability of having a second birth for women with one daughter is higher than for those with one son; and the probability of giving a third birth for women with two daughters is significantly higher than for those with both one son and one daughter (Tu and Chen, 1991). Among women who have completed reproduction, the proportions of women with at least one son to stop progression to higher order births are higher than those without sons (Duan ,1991). These studies have proved the existence of influence of son preference on fertility motive and behavior in both past and present China. However, we may further ask: how does the son preference influence fertility behavior for the population in general, how large the influence has been, and will it hamper further fertility decline? These questions deserve more attention and research.

This chapter is to study, for China as whole and for urban and rural areas during the period 1955-92, the relationship between the decline in period parity progression ratios of women and the sex composition of their children. The quantitative influence of son preference on fertility decline will also be estimated in the study. We will also examine the relationship between sex ratio at birth with the sex composition of children.

The data used in this study are from the 1992 Fertility Sample Survey in China, the 1982 National One-per-Thousand Fertility Survey and the 1988 National Two-per-Thousand Fertility Survey, conducted by the Family Planning Commission of China and the data of 1990 population census of China. It is our intention that the findings of the study may provide some references for further improving policy implementation. In order to study the impact of parents preference for sex of children on their fertility behavior, we use period parity progression ratios as the measure of fertility level of women for the period 1955-92. After a brief description of the method of period parity progression ratios, an evaluation of the data is made.

Period parity progression ratios

Period parity progression ratios, proposed first by Louis Henry in 1953 (Henry, 1980) and improved and refined by Feeney and Yu (1987), are a method for measuring the period fertility level of women. It computes period ratios for progression of women from their birth to first marriage, from first marriage to giving first birth, and from birth I to birth I+1 (I=2,3,...,n), on the basis of data tabulated by the year of the birth of women and of their first marriage, and the year of having their serial parity children. Let $q_{i,0}$ denote the proportion of women having birth I at year t to give birth I+1 at the same year; $q_{i,j}$ denote the proportion of women having birth I at year t-j to give birth I+1 at year t ; $W_i(t)$ denote

the number of women give birth I at year t; $W_{i+1}(t, j)$ denote the number of women having birth I at year t-j to give birth I+1 at year t, I = 0, 1, ..., n; j = 0, 1, ..., m, thus

$$q_{i,j} = \frac{W_{I+1}(t, j)}{W_I(t-j) - \sum_{k=0}^{j-1} W_{I+1}(t-j+k,k)} \qquad (1)$$

$$j=0,1,2,\ldots, m$$

so the (period) parity progression ratios for year t from birth I to birth I+1 are given by:

$$\begin{aligned} P_{I-(I+1)}(t) = {} & q_{i,0}(t)+(1-q_{i,0}(t-1))q_{i,1}(t) \\ & +(1-q_{i,0}(t-2))(1-q_{i,1}(t-1))q_{i,2}(t) + \ldots \\ & +(1-q_{i,0}(t-m))(1-q_{i,1}(t-(m-1)))(1-q_{i,2}(t-(m-2))) \ldots \\ & (1-q_{i,m-1}(t-1))q_{i,m}(t) \end{aligned} \qquad (2)$$

$$I = 1,2,\ldots, n$$

Similarly, let $P_{b-m}(t)$ denote the progression ratio for year t from women's birth to their first marriage, $P_{m-1}(t)$ denote the progression ratio for year t from their first marriage to their first birth (the computation of $P_{b-m}(t)$ and $P_{m-1}(t)$ are similar to formula (1)), then :

$$\begin{aligned} TFR(t) = {} & P_{b-m}(t)P_{m-1}(t)+P_{b-m}(t)P_{m-1}(t)P_{1-2}(t)+ \ldots \\ & + P_{b-m}(t)P_{m-1}(t)P_{1-2}(t) \ldots P_{(n-1)-n}(t) \end{aligned} \qquad (3)$$

Here "TFR" represents the number of children born, during the lifetime, to a hypothetical cohort of women experiencing the period parity progression ratios from birth I-1 to I (called simply ith progression ratio $P_i(t)$), I=1,2,...n, and it is therefore called the total fertility rate based on period parity progression ratios. $P_{b-m}(t)$ ($P_{m-1}(t)$)is a progression ratio from being born to first birth, denoted as P_{0-1} .

Define:

$$TFR_1 = P_{b\text{-}m} P_{m\text{-}1}$$
$$TFR_2 = P_{b\text{-}m} P_{m\text{-}1} P_{1\text{-}2}$$
$$\ldots \quad \ldots$$
$$TFRn = P_{b\text{-}m} P_{m\text{-}1} P_{1\text{-}2}(t) \ldots P_{(n-1)\text{-}n}(t)$$

then TFR_i expresses the contribution of the progression ratio from birth I-1 to I, I=1,2,...n, to the total fertility rate. As the TFR calculated from formula (3) is not influenced by a sharp rise or fall in the number of marriages or births, and it estimates the effect on total fertility of the proportion of women with I children who have I+1 children, it provides a better measure of the fertility level than the TFR summed up from age- specific fertility rates. Calculation of period parity progression ratios requires the time serial information of women's birth, first marriage and their childbearing over several decades, so it is a measure typically based on the fertility history of women.

Data

In October, 1992 the State Family Planning Commission of China conducted a fertility sample survey of 380 thousand people covering all 30 provinces in China, which provided information on women's marriage, fertility and contraception, including fertility histories for 100 thousand women with the years of birth and the health status of their last four children. From the data we have calculated period parity progression ratios of China for years 1973-92, as shown in Table 6-1.

Table 6-1 shows that for most of the years the TFRs calculated using period parity progression ratios and data from the 1992 Fertility Sample Survey are basically consistent with TFRS calculated either from period parity progression ratios or from age-specific fertility rates using data from the 1982 National one-per-thousand Fertility Survey, the 1988 National two-per-thousand Fertility Survey, and the 1990 population census. The data quality of the 1982 and 1988 fertility sample surveys have been widely appreciated. In addition, a comparison of the crude rates of fertility for years 1986-92 calculated from the 1992 fertility survey with that calculated from the sample survey on population change by the State Statistical Bureau and the 1990 population census also demonstrates their consistency (Wang, 1994).

Table 6-2 shows the period parity progression ratios for the years 1980-92 from the data on the number of children living with their mothers and the number of children who did not live with their mothers or who were dead at the time of survey but reported by their mothers in their fertility history. There is also a high consistency between table 6-1 and table 6-2, and our analysis below is largely based on the data in table 6-2.

Considering the fact that sex preference as a fertility behavior of women is responsive to the surviving children, we calculated the period parity progression ratios based on the surviving children of women, as shown in table 6-3. It can be seen that these ratios are slightly lower than that in table 6-2, which reflects the fact that women tend to replace children who died. The TFRs in table 6-3 are those based on the surviving children. Table 6-4 displays the period parity progression ratios by sex composition of the surviving children for China as a whole and for urban and rural areas for the years 1980-92, which is the focus of attention of this paper.

In order to examine the impact of sex preference on women's fertility behavior before the 1980s, we have also calculated the period parity progression ratios for the years 1955-81 from a 10 percent subsample of the 1982 National one-per-thousand Fertility Survey, and these ratios, as shown in table 6-6, are very close to the ratios calculated from the 100 percent sample of the survey (Feeney and Yu, 1987). Table 6-7 presents the parity progression ratios based on the surviving children for the same period. Table 6-8 and table 6-9 show parity progression ratios by sex composition of children ever born and of the surviving children, respectively. It is found that parity progression ratios in both tables 6-8 and 6-9 are decreasing with the increase in the number of sons women have, and the ratios in table 6-9 are slightly lower that in table 6-8.

The progression ratios in Table 6-9, for the period 1955-81, are analogous to those in Table 6-4, for the period 1980-1992. In both tables progression ratios are based upon number of living children, rather than children ever born to better capture the effect of family size on the decision to have more births. The progression ratios given in tables 6-2, 6-4, 6-5,6-6,6-9 and 6-10 are graphically displayed in figures 1-18.

Period parity progression ratios: China as a whole, urban and rural areas, 1955-92

In the first place, we observe the process of change in parity progression ratios and the corresponding levels of fertility for China as a whole since the 1950s. Figure 1 shows that in the mid-1950s progression ratios to births of first and higher orders were all as high as about 0.95 or over, and the corresponding TFR was about 6.5 for China (table 6-6). During the period of 1959-61 progression ratios for every parity all dropped sharply due to economic difficulty at that time. The TFR dropped to its lowest value in that period of 3.2 in 1961. However, immediately after that progression ratios for all parities rose rapidly and reached their highest levels in 1963, when the TFR reached 7.3. Since then, the progression ratios all have experienced a secular decline except for the progression from marriage to first birth. There was another downward fluctuation for all parities in 1967, owing to, the disturbance on fertility of the Cultural Revolution (Chen, 1983, Feeney and Yu, 1987).

Since the appreciable decline in infant mortality and the introduction of the family planning program, progression ratios to births of third and higher orders have been declining since as early as the mid-1960s, and the decline accelerated in the 1970s. In the 1970's the progression ratios from second to third birth also experienced a significant decline. By 1980, the progression ratio from second to third births dropped to 0.5 and the ratios for third and higher order births dropped to about 0.4, while the ratios from first to second birth stayed about 0.95 or over, similar to the progression ratios from marriage to first birth. By way of comparison, fertility decline in Thailand and Taiwan also started in the 1960s and speeded up in the 1970s. In the two regions, the progression ratios from second to third birth dropped from about 0.95 in 1955 to 0.72 in Thailand, and to 0.52 in Taiwan, and that from third to fourth birth dropped to 0.68 (Thailand) and 0.44 (Taiwan) respectively by 1990 (Norman and Chintana, 1991; Feeney, 1991). Compared with these two regions, the decline in progression ratios in China has been very fast. This decline was achieved under the conditions of low economic development and low per capita income, and was primarily a result of the successful family planning program in China. The large declines in progression ratios to third and higher orders significantly reduced the fertility level of Chinese women to a TFR of about 2.7 in 1980.

After entering the 1980s the progression ratio from second to third birth dropped further, and that for fourth and higher orders continued to be at very low levels. With the advocacy of the "one couple one child" policy by the Government, the progression ratio from first to second birth began to fall. Figure 2 shows that it dropped to a lowest value in the 1980s of 0.69 in 1984 and rose to 0.84 in 1987. There were similar fluctuations for other parities but with smaller swings. After 1988 the progression ratios for every parity dropped continually, with the ratios from first to second birth down to 0.7, that from second to third birth under 0.4, and the TFR reached the replacement level by 1990. Family planning efforts launched during the 1970s were intensified in the 1980s, resulting in a further decline in the progression ratios at all parities.

As indicated by figures 1 and 2, the lifetime marriage rate of Chinese women has traditionally been at 0.99 or over, and except for the three years, 1959-61, of natural disaster, the proportion of the married women with at least one child was about 0.98-0.99, implying a progression ratios of 0.97-0.98, which is relatively high by international standards (Huang and Xie, 1991). Fertility decline in China has resulted primarily from the reductions in the progression ratios for births at second and higher orders.

Now we turn to look at the difference between urban and rural areas of China in period parity progression ratios and their changes. As is shown in figures 3 and 5, both urban

and rural progression ratios were affected by the three years of natural disaster in the late 1950s and the early 1960s and the Cultural Revolution in the mid-1960s, with the latter having a more serious effect on urban ratios than on rural ones. It can be seen that the higher the parity progression ratios are, the earlier and faster the declines occur, for urban areas in particular. The urban progression ratios to fourth and higher orders began to decline considerably as early as 1964, and by the end of the 1970s they reached a relatively low level. Progression ratios from second to third birth and from first to second birth followed similar patterns of decline. The progression from second to third birth began to decline in the early 1970s eventually dropping below 0.2. The ratio for first to second birth began to decline in the mid-1970s, picking up momentum after 1978, and dropping below 0.3 in the 1980s (figure 4).

Differences in socio-economic conditions between rural and urban areas account for the fact that declines in progression ratios for second and higher order birth began later and were slower in rural than in urban areas. The progression ratios to sixth and seventh birth, fourth and fifth birth and third birth began to decline in rural areas in the 1960s, the early 1970s, and the mid-1970s, respectively. This decline accelerated in the 1970s. By the end of the 1970s progression ratios to fourth and higher orders were under 0.5, that from third to fourth birth was also reduced to about 0.6.

During the 1980s progression ratios to second and higher orders for rural areas were all reduced further by about 0.1. Thus progression ratios to fourth, third and second orders were stabilized, respectively, at the level of 0.4, 0.5 and 0.85. In the beginning of the 1990s progression ratios to second and higher orders again declined in rural areas (figure 6).

The effects of sex composition of surviving children on period progression ratios

Parity progression ratios to fourth and higher orders in China started to fall in the 1960s, and the pace of decline accelerated in the 1970s, with the ratios for third and higher order births stabilizing at lower levels in the 1980s. During this period of fertility transition, how did sex preference affect women's fertility behaviors? In other words, what is the relationship between the decline in period progression ratios and the sex composition of the surviving children? To answer this question, we calculated the progression ratios for births of second and higher orders according to sex composition of the surviving children. The results for China as a whole, are shown in figures 7 to 10 (values for these progression ratios are given in tables 6-4 and 6-9).

It is found that all the period progression ratios, for different sex compositions of children already born exhibit similar trends to the overall progression ratios. Figure 7

shows that before 1980 progression ratios from first to second birth were all higher than 0.95 both for women with a son and for women with a girl. This means that at that time it was common for people to progress from one child to two children regardless of sex of the first child. Since 1980, with the reduction of progression ratios from first to second birth, that for women with a daughter has been decreased to about 0.8 while that for women with a son has decreased to about 0.7. The difference between progression ratios to a second birth between women with a daughter and a son has always been about 0.1. This difference has widened somewhat when the fertility level went down, and it has narrowed when the fertility level went up.

This feature is more striking for the decline in progression ratios from second to third birth. At the beginning of the 1970s progression ratios from second to third birth declined sharply among women with one or two sons, while for women with no sons, the decline was moderate (figure 7). After 1980, the progression ratio from second to third birth for women without sons was reduced to about 0.7, while for women with one or two sons the ratio dropped under 0.4 (figure 8). The progression ratio from a second to third birth among women with two daughters is as high as the progression from the first to second birth for women with one son.

Similarly the decrease in the progression ratio from third to fourth birth first occurred among women with at least one son in the mid-1960s. For women with two or three sons the decline was the quickest, followed by the decline for women with one son; and the decline for women with no sons was much slower. Figure 9 shows that compared with the sharp downward trend in the progression ratio from third to fourth birth for women with sons, the downward fluctuation for women without sons was less even during the famine years 1959-61. It suggests that women without sons had an urgent desire to have a son even through such a difficult time. After the start of the 1980s the overall progression ratio from third to fourth birth declined to under 0.4 (figure 6), while for those women without sons the ratio remained at the level of 0.6 (figure 10). Since the proportion of women without sons among women with three children is very small (about 1/8), the overall progression ratio from third to fourth birth also dropped below 0.4.

The above phenomenon shows that the decrease in progression ratios to second and high orders always first took place among women with one or more sons, while for women without sons, the decline was more difficult, demonstrating that it would be easy to reduce family size after women achieved an ideal of having at least one son. We have noted that progression ratios to third and higher orders decreased with the increase in the number of the surviving sons in the family. For women with only sons the progression ratios have also been higher than for women with both sons and daughters. This implies that people wish

to have children of both sexes once they have achieved adequate number of sons. Nevertheless, the desire to have a daughter for women without daughters is not as strong as that to have a son for women without sons.

Urban-Rural differences in the effects of sex composition of the surviving children on progression ratios

We have seen above that the decrease in progression ratios to second and high orders first occurred among the women with at least one son, and disparities emerged between the women with and without sons when progression ratios began to fall. We next consider whether there were urban-rural differences in the effects of sex preference on fertility. It is well known that significant differences in fertility behavior exist between urban and rural women. Fertility levels of urban women in China declined first and reached replacement level in the early 1980s.

Figures 11 through 14 show period parity progression ratios for second and third order births by sex composition of children for urban and rural areas during the period 1955-92. Figure 11 shows that prior to 1973, progression ratios from first to second birth were over 0.95 both for urban and rural women, regardless of the sex composition of children in the family. After 1979 with the introduction of the "one couple one child " family planning policy, progression ratios from first to second birth fell sharply in urban areas and a difference emerged between the curve of progression ratios for women with and without a son. Up to the mid-1980s progression ratios from first to second birth for women with 1 daughter was reduced to about 0.3, while PPRs for those with a son were always 0.05 lower than for women with a daughter. In rural areas the progression ratio from first to second birth for women with a daughter stayed at the level of 0.85 while for women with a son it was 0.1 lower. When fertility rose in 1986, the progression ratio for women with a son went up as well (figure 12). Figure 13 shows that the decline in the progression ratio from second to third birth since the 1960s first occurred in urban areas and first took place among women with at least one son, while the decline for women with only daughters lagged behind by about 5 years. There emerged a big gap between women with and without sons when the ratio for women with sons dropped sharply during the 1970s. During that time the progression ratio from second to third birth began to decline in rural areas and the difference in progression ratios between women with sons and those without sons enlarged gradually. After 1980, progression ratios for women without sons reduced to less than 0.4, the difference in progression ratios between the two types of women was about 0.2 in urban areas, while for rural areas it was about 0.4 (figure 14).

It can be seen from above that the progression ratios by sex composition of children have followed a pattern of change that is similar for urban and rural areas. The fact that the decline in progression ratios all first took place among women with at least one son suggests that there existed obvious son preference in both urban and rural areas. Because of the difference in the level of socioeconomic development, urban areas have taken the lead in progression ratios decline in as early as the mid-1960, and the differential fertility behavior by sex composition of children also occurred first in urban areas.

The norms of sex preference were not induced by fertility decline. They had existed in Chinese culture for a long time. Before the mid-1960s having sons was achieved naturally through giving numerous births. With the reduction in fertility the difference in fertility behaviors by sex composition of children broadened. This phenomenon occurred first in urban areas and then in rural areas and gradually weakened in urban areas, suggesting that differential fertility due to sex preference is a transitional phenomenon during the fertility decline.

The effects of sex preference on fertility level

We have seen from above that sex preference affects parity progression in both in urban and rural areas. We now consider how much the sex preference has affected fertility levels? Figures 7 and 8 show that the progression ratios from first to second birth for women with a son is lower than that for women with a daughter; the progression ratios from second to third birth is lowest for women with a son and a girl. Similarly, the progression ratios to fourth, fifth and sixth birth were also lowest for women with (n-1) sons and one girl for most of the years. If there were no effect of sex preference, all the progression ratios would be equal to the lowest one in the same parity. The fertility level corresponding to the lowest progression ratios in the same parity for each parity can be considered as an estimate of the fertility level excluding sex preference. This will be denoted as TFR1. Thus the difference between TFR and TFR1 can be considered as the increment in the TFR caused by sex preference. Supposing that dead children do not affect the sex preference, then the difference between the progression ratios based on children ever born TFR(CEB) and the corresponding TFR1(CEB) will be equal to the difference between the progression ratios based on surviving children TFR(CS) and the corresponding TFR1(CS). We then let dT denote the increment in the TFR caused by sex preference,

$$\begin{aligned} dT &= TFR(CEB)-TFR1(CEB) \\ &= TFR(CS)-TFR1(CS) \end{aligned}$$

and dT can be called the average number of additional children associated with sex preference per women. Figures 15-16 show that the absolute increment in the TFR due to sex preference first rose to 0.15 in the mid- 1960's then to 0.25 in the 1970's and then dropped to 0.2 in the 1980's. At the beginning of fertility decline, the differential progression ratios between women with sons and without sons increased and the value of dT increased correspondingly. When fertility was stabilized at a low level, the progression ratios for women without sons also reached a relatively low level, and the gap between them and that for women with sons decreased. Urban areas have completed such a progression, while the rural area is still in transition. The value of dT was 0.16 in 1989 for the country as a whole, if there were no effect of sex preference at all, the TFR in 1989 would have decreased from 2.23 to 2.07.

The discussion above is about the absolute effects of sex preference on the fertility level of China as a whole and for urban and rural areas since 1955. Now we are going to examine the relative effect of differential fertility behaviors caused by sex preference on the fertility level. Let

$$\frac{dT}{T}\% = \frac{TFR(CEB)-TFR1(CEB)}{TFR(CEB)}\ 100\%$$

$$= \frac{TFR(CS)-TFR1(CS)}{TFR(CS)}\ 100\%$$

dT/T is the proportion of dT in the TFR. This can also be considered the average number of additional children associated with sex preference per given birth.

With the decrease in progression ratios since the mid-1960s in China, the value of dT/T increased from 0.015 in 1965 to 0.03 in 1970 and 0.06 in 1975; it has fluctuated around 0.08 since 1980. This means that about 8 per cent of births can be attributed to the greater propensity of women with few sons and without sons or without daughters to progress to higher parities than do women with both sons and daughters (figures 17 and 18 and tables 6-5 and 6-10). When fertility dropped greatly in 1961 and 1967, the decline in progression ratios for women with sons was more dramatic, so the proportion of fertility level caused by sex preference increased. When fertility rose in 1963, however, the difference in progression ratios between women with and without sons diminished, so that the proportion of fertility attributed to sex preference was reduced. When progression ratios

to third and higher orders decreased greatly in the 1970's, the reduction was greatest for women with sons.

Now we consider the difference in dT/T by urban and rural areas since 1955. The progression ratios to fifth and sixth birth for urban women with sons began to decline as early as the late 1950s, and to third and fourth births they started to decline in the mid-1960s. With the decrease in progression ratios to third and higher orders in rural areas and the faster decrease in the ratios for women with sons the value of dT/T in rural areas began to rise. Since 1980, the progression ratios to second and higher orders in urban areas have all dropped below 0.3 including those for women without sons. In rural areas the progression ratios to third and fourth birth for women without sons have remained at the level of 0.6-0.8, while those for women with sons have dropped below 0.4. The progression ratio from second to third birth for women without sons is as high as 0.85, while that for women with a son is about 0.1 lower than for those without sons. Not only the level of the progression ratios but also the difference attributed to sex preference is greater for rural areas than for urban areas. In the 1980s the value of dT/T for urban areas has fallen below 0.03, while that for rural areas is still around 0.08. Since about 80 per cent of women giving birth live in rural areas, the curve of dT/T for the country as a whole is similar to that for rural areas.

The effects of sex preference on the sex ratio at birth

The effect of sex preference on fertility behaviors is not only reflected in whether or not they will progress to the next birth, but also in the selection of the sex of children they want through medical technologies. Since 1980, the sex ratio at birth of China has been rising steadily. The sex ratio at birth (SRB) gives the number of male births for every 100 female births. It rose from 108.47 in 1981 (the third census in 1982) to 111.00 in 1987 (1988 two-per-thousand fertility sample survey), and to 111.27 in 1989 and 111.87 in the first half of 1990 (the fourth census in 1990). The unusually high sex ratio at birth in recent years in China has attracted much attention from the public and the governmental departments concerned.

The data from the 1992 fertility sample survey in China shows that the sex ratio at age 0 in 1992 was 115.7. We estimated roughly the number of births that occurred during the period of October 1991 to October 1992 by summing together the surviving infants and dead infants at age 0 in 1992, then the sex ratio at birth during this period was estimated to be 115.9. Looking at urban-rural differences, we see that the sex ratio at birth for the urban population (non-agriculture) in 1992 was 107.4, compared to 117.2 for the rural population. (figure 19). The sex ratio at birth varies according to parity, with it being higher at higher parities. For rural areas the SRB is higher than normally expected for all parities higher than

the first birth. In urban areas the SRB is within the expected range for first, second and third births but at 217.6 is twice the expected average for fourth births.

By decomposing the sex ratio at birth at each parity by the number of previous surviving sons, we find that there was an obvious negative correlation between sex ratio at birth and the number of previous surviving sons for each parity (Figure 20). For example, sex ratio at the second parity for women with a daughter was 184.1, while that for women with a son was 103.4; there were similar features for each parity; while for women without a son, the sex ratio at the second birth was 184.1, that at the third birth was 197.9 and at the fourth birth was 285.2. Such a phenomenon suggests that, for women without a son, the more births they have, the more likely they are to select the sex. For women with one son, the sex ratio at the second birth was 103.4, while at the third birth it was 113.5 and at the fourth birth it was 170.0. These findings are very similar to findings in the 1990 population census. It should be also noted that the sex ratio at third and higher order births for women without daughters was unusually low, which was also similar to the phenomenon in the data of 1990 census, and might be related to the exchange of children (Gao, 1993). All these demonstrated that there has been obvious sex preference in the people's fertility behaviors and birth reporting, and suggest that under reporting of female births and selective abortion may take place among those women with no son or few sons.

Conclusion

Progression ratios to births of fourth and high orders began declining in the mid-1960s in China, and the decline accelerated in the 1970s. Meanwhile progression ratios from second to third birth also began to decline significantly. The 1980s has witnessed a stabilization of the parity progression ratios at a lower level. Due to the influence of the son preference of parents, this decline first took place among the women with at least one son, while for those women without sons, the decline has been very slow. While in the 1980's progression ratios to second, third and fourth birth for rural women without sons were 0.85, 0.80 and 0.86, respectively, the ratios for women with sons were reduced to below 0.4, implying that it is easier to stop having children once one has achieved the ideal of having at least one son.

The relative increment in the TFR associated with sex preference first increased with fertility decline and then declined. At present the relative impact of sex preference on fertility in China is about 0.08, that is: for every birth that occurs there about 0.08 births due to sex preference. The proportion of the TFR attributed to son preference has been lessening with continued fertility decline and the narrowing of the difference between the progression

ratios for women with and without sons. In urban areas such a transition has completed, while in rural areas it is still ongoing.

The absolute increment in the TFR due to sex preference has followed a similar pattern: that is, a period of increase precedes a period of decline. If there were no effect of sex preference at all, the TFR would decrease by about 0.2. Since the proportion of women without sons decreases rapidly with the increase of birth order, sex preference will not be a major obstacle to further decline in fertility

Male preference has been prevalent in China for thousands of years. Before fertility decline the ideal of having sons was achieved naturally through having more births. While son preference has weakened in China since 1950, people still wish to have at least one son in their small families, therefore fertility behavior is different for women with and without sons. With the development of society and the economy, urbanization, improvement in old-age security system, transition of fertility norms and stabilization of fertility at the low level, the differential fertility behaviors caused by sex preference are expected to weaken, as has already occurred in urban areas in China.

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Table 6-1. Period parity progression ratios for China, 1973-92
1992 Fertility and Family Planning Planning survey

Year	P_{B-M}	P_{M-1}	P_{B-1}	P_{1-2}	P_{2-3}	P_{3-4}	P_{4-5}	P_{5-6}	P_{6-7}	TFR[2]	TFR[3]	TFR[4]	TFR[5]	
1973	.990	.931	.922	.984	.952	.839	.729	.864	.917	4.82	4.30	—	—	
1974	.988	.959	.947	.983	.939	.799	.712	.655	1	4.60	4.09	—	—	
1975	.986	.966	.952	.968	.893	.727	.630	.856	.463	4.15	3.74	—	—	
1976	.998	.982	.980	.990	.864	.627	.516	.647	1	3.94	3.51	—	—	
1977	.994	.974	.968	.983	.793	.553	.546	.962	.397	3.63	3.30	—	—	
1978	.993	.977	.970	.980	.757	.558	.457	.420	.556	3.35	3.23	—	—	
1979	.998	.985	.983	.981	.731	.501	.423	.543	.497	3.28	3.24	—	—	
1980	.999	.987	.986	.947	.592	.489	.349	.412	.381	2.89	2.77	—	—	
1981	.999	.987	.986	.904	.525	.378	.379	.333	.343	2.62	—	2.61	—	
1982	.999	.992	.991	.832	.564	.399	.340	.379	.504	2.57	—	2.86	—	
1983	.998	.988	.986	.759	.509	.365	.298	.336	.301	2.31	—	2.42	—	
1984	.999	.988	.987	.685	.445	.342	.280	.373	.365	2.11	—	2.35	—	
1985	.999	.988	.987	.745	.456	.323	.307	.373	.450	2.22	—	2.20	2.07	
1986	.999	.990	.989	.817	.494	.380	.329	.364	.413	2.42	—	2.42	2.35	
1987	.998	.992	.990	.837	.499	.386	.366	.434	.415	2.49	—	2.58	2.46	
1988	.999	.994	.993	.773	.488	.349	.365	.318	.318	2.33	—	—	—	
1989	.999	.991	.990	.752	.425	.369	.363	.326	.375	2.23	—	2.25	—	
1990	.999	.988	.987	.718	.375	.312	.318	.284	.204	2.08	—	—	—	
1991	.998	.981	.979	.579	.278	.189	.185	.245	.257	1.74	—	—	—	
1992	.999	.950	.949	.411	.147	.128	.131	.144	.104	1.40[1]	—	—	—	

Notes: [1] TFR in 1992 is calculated from the number of births in the first 10 months in 1992, there is not any adjustment in the calculation here.

[2] Based on the Period parity progression ratios calculated from the fertility history reported by women in the data of 1992 Fertility Sample Survey in China .

[3] Based on the Period parity progression ratios calculated from the 1982 one-per-thousand Fertility Sample Survey in China (Feeney and Yu,1987).

[4] Based on the age specific fertility rate calculated from the 1988 two-per-thousand Fertility Sample Survey in China (Liang Jimin, Chen Shengli, Tabulation on the 1988 two-per-thousand Fertility Sample Survey in China) and the data of 1990 population census of China.

[5] Based on the Period parity progression ratios calculated from the 1988 two-per-thousand Fertility Sample Survey in China (Huang Dexing, Xie Zhengmin, 1991).

Table 6-2. Period parity progression ratios: China, urban and rural, 1980-92

	Year	P_{B-M}	P_{M-1}[1]	P_{1-2}	P_{2-3}	P_{3-4}	P_{4-5}	P_{5-6}	P_{6-7}	TFR
China										
	1980	.999	.993	.951	.518	.436	.335	.439	.050	2.741
	1981	.998	.992	.907	.491	.356	.348	.360	.076	2.562
	1982	.999	.995	.838	.512	.387	.326	.364	.095	2.494
	1983	.998	.989	.764	.471	.348	.309	.320	.085	2.271
	1984	.999	.990	.692	.432	.336	.277	.351	.078	2.106
	1985	.999	.988	.749	.441	.314	.294	.376	.126	2.198
	1986	.999	.991	.811	.475	.378	.328	.357	.171	2.385
	1987	.998	.991	.839	.487	.382	.364	.413	.161	2.460
	1988	.999	.992	.777	.477	.348	.360	.303	.146	2.318
	1989	.999	.987	.761	.421	.372	.372	.318	.143	2.229
	1990	.998	.982	.725	.373	.311	.322	.273	.069	2.072
	1991	.998	.974	.581	.274	.186	.186	.265	.070	1.727
	1992[1]	.999	.936	.414	.148	.135	.132	.138	.076	1.388
Rural										
	1980	1.00	.995	.977	.569	.477	.354	.446	.052	2.921
	1981	1.00	.994	.956	.552	.382	.367	.367	.079	2.772
	1982	.998	.996	.922	.564	.408	.341	.374	.092	2.740
	1983	.998	.991	.883	.510	.362	.321	.329	.087	2.539
	1984	1.00	.992	.833	.463	.350	.282	.354	.080	2.387
	1985	1.00	.992	.882	.470	.323	.299	.373	.127	2.467
	1986	.999	.993	.926	.495	.388	.334	.365	.175	2.626
	1987	.999	.992	.943	.509	.388	.372	.419	.153	2.688
	1988	.999	.993	.905	.505	.352	.360	.306	.147	2.580
	1989	1.00	.987	.886	.442	.381	.377	.316	.144	2.471
	1990	1.00	.984	.872	.389	.315	.321	.277	.069	2.325
	1991	.998	.978	.738	.287	.189	.188	.270	.071	1.952
	1992[1]	.998	.939	.550	.154	.134	.126	.141	.076	1.544
Urban										
	1980	.999	.989	.735	.228	.160	.063	.413	.000	1.909
	1981	.999	.987	.583	.114	.121	.137	.255	.000	1.636
	1982	.998	.991	.386	.159	.133	.062	.097	.121	1.440
	1983	.999	.979	.257	.175	.177	.293	.000	.000	1.283
	1984	.998	.980	.196	.203	.077	.173	.221	.000	1.212
	1985	.999	.971	.251	.200	.166	.395	.373	.000	1.275
	1986	.999	.983	.289	.243	.225	.066	.000	.000	1.351
	1987	.998	.984	.320	.220	.309	.000	.000	.361	1.387
	1988	.999	.983	.281	.159	.291	.343	.000	.000	1.319
	1989	.999	.987	.309	.192	.163	.219	.245	.000	1.361
	1990	.997	.974	.206	.165	.192	.573	.000	.000	1.214
	1991	.997	.957	.163	.129	.107	.188	.000	.000	1.132
	1992[1]	.998	.926	.121	.080	.163	.333	.000	.000	1.047

Source: 1992 Fertility and Family Planning Survey

Note: Calculated from the number of children in the data and the number of births reported by women who did not live with mothers or were dead at the time of survey.

[1]TFR in 1992 is calculated from the number of births in the first 10 months in 1992, there is not any adjustment in the calculation here.

Table 6-3. Period parity progression ratios based on the surviving children of women: China, urban and rural, 1980-92

	Year	$P_{B\text{-}M}$	$P_{M\text{-}1}$	$P_{1\text{-}2}$	$P_{2\text{-}3}$	$P_{3\text{-}4}$	$P_{4\text{-}5}$	$P_{5\text{-}6}$	$P_{6\text{-}7}$	TFR	TFR_m
China											
	1980	.999	.993	.812	.491	.422	.302	.233	.085	2.423	2.225
	1981	.998	.992	.787	.470	.366	.303	.350	.292	2.328	2.140
	1982	.999	.995	.766	.495	.388	.313	.405	.339	2.349	2.113
	1983	.998	.989	.668	.452	.357	.306	.237	.133	2.092	1.890
	1984	.999	.990	.640	.422	.335	.311	.276	.191	2.016	1.850
	1985	.999	.988	.693	.408	.295	.258	.378	.477	2.066	1.920
	1986	.999	.991	.762	.458	.374	.324	.306	.545	2.281	2.075
	1987	.998	.991	.811	.469	.357	.334	.384	.352	2.370	2.197
	1988	.999	.992	.748	.458	.351	.316	.257	.365	2.242	2.055
	1989	.999	.987	.730	.392	.370	.307	.314	.269	2.137	1.975
	1990	.998	.982	.704	.343	.290	.273	.241	.078	1.999	1.813
	1991	.998	.974	.562	.238	.169	.155	.220	.171	1.675	1.552
	1992	.999	.936	.399	.115	.101	.084	.102	.184	1.356	1.266
Rural											
	1980	1.00	.995	.853	.537	.450	.342	.229	.094	2.592	2.372
	1981	1.00	.994	.849	.526	.391	.311	.366	.246	2.534	2.313
	1982	.998	.996	.850	.543	.408	.322	.410	.363	2.579	2.309
	1983	.998	.991	.781	.487	.372	.331	.242	.137	2.337	2.100
	1984	1.00	.992	.757	.449	.348	.312	.275	.193	2.246	2.045
	1985	1.00	.992	.810	.435	.302	.258	.386	.486	2.293	2.120
	1986	.999	.993	.875	.475	.384	.330	.317	.562	2.509	2.269
	1987	.999	.992	.913	.490	.361	.340	.382	.361	2.582	2.384
	1988	.999	.993	.873	.482	.352	.314	.252	.365	2.484	2.264
	1989	1.00	.987	.859	.410	.378	.309	.308	.249	2.370	2.178
	1990	1.00	.984	.848	.359	.292	.273	.245	.080	2.236	2.018
	1991	.998	.978	.716	.249	.171	.156	.225	.177	1.885	1.717
	1992	.998	.939	.531	.120	.104	.085	.104	.187	1.501	1.370
Urban											
	1980	.999	.989	.573	.189	.125	.000	.259	.000	1.675	1.564
	1981	.999	.987	.437	.101	.098	.163	.177	1.00	1.466	1.404
	1982	.998	.991	.322	.129	.134	.075	.000	.000	1.354	1.277
	1983	.999	.979	.205	.159	.200	.240	.000	.000	1.218	1.166
	1984	.998	.980	.186	.211	.081	.275	.245	.000	1.203	1.153
	1985	.999	.971	.232	.156	.178	.219	.000	.000	1.238	1.195
	1986	.999	.983	.259	.234	.187	.000	.000	.000	1.307	1.252
	1987	.998	.984	.307	.193	.281	.000	.520	.000	1.358	1.323
	1988	.999	.983	.249	.151	.375	.400	.297	.000	1.284	1.263
	1989	.999	.987	.255	.166	.174	.252	.324	1.00	1.289	1.227
	1990	.997	.974	.188	.122	.227	.551	.000	.000	1.184	1.123
	1991	.997	.957	.136	.111	.110	.231	.000	.000	1.100	1.082
	1992	.998	.926	.108	.041	.000	.000	.000	.000	1.028	1.012

Source: Same as table 2

Note: TFR_m is calculated from the lowest Period parity progression ratios of those by sex composition in the same parity for each category of parity..

Table 6-4. Period parity progression ratios by sex composition of the surviving children of women: China, urban and rural, 1980-92

Year	P_{1-2} 0s	P_{1-2} 1s	P_{2-3} 0s	P_{2-3} 1s	P_{2-3} 2s	P_{3-4} 0s	P_{3-4} 1s	P_{3-4} 2s	P_{3-4} 3s
China									
1980	.860	.764	.734	.435	.370	.716	.432	.320	.348
1981	.848	.729	.669	.411	.421	.596	.363	.309	.292
1982	.830	.705	.738	.433	.388	.665	.403	.255	.342
1983	.741	.599	.693	.387	.348	.589	.350	.261	.378
1984	.690	.595	.635	.334	.395	.613	.292	.272	.316
1985	.739	.654	.649	.337	.327	.596	.256	.229	.246
1986	.806	.723	.700	.372	.402	.654	.373	.261	.356
1987	.838	.787	.726	.396	.382	.688	.327	.262	.302
1988	.797	.704	.749	.376	.359	.684	.335	.278	.215
1989	.767	.698	.706	.315	.293	.771	.334	.270	.306
1990	.770	.643	.660	.263	.256	.714	.254	.165	.216
1991	.630	.508	.539	.156	.177	.544	.131	.103	.109
1992	.485	.326	.308	.081	.063	.288	.089	.055	.098
Rural									
1980	.899	.807	.783	.480	.409	.788	.449	.343	.372
1981	.908	.789	.738	.460	.474	.645	.392	.331	.314
1982	.909	.791	.795	.477	.434	.696	.426	.272	.363
1983	.853	.710	.749	.422	.368	.622	.368	.266	.394
1984	.812	.708	.672	.357	.424	.638	.302	.283	.326
1985	.858	.769	.694	.360	.351	.610	.262	.235	.257
1986	.920	.835	.733	.385	.417	.665	.386	.272	.355
1987	.940	.889	.759	.414	.399	.700	.331	.266	.299
1988	.924	.828	.787	.394	.382	.703	.334	.276	.210
1989	.902	.826	.744	.330	.303	.784	.346	.279	.311
1990	.918	.784	.693	.277	.267	.716	.256	.170	.218
1991	.818	.642	.572	.162	.184	.550	.132	.106	.110
1992	.671	.424	.334	.085	.067	.297	.091	.056	.101
Urban									
1980	.632	.513	.383	.132	.135	.231	.219	.027	.104
1981	.483	.390	.207	.075	.084	.283	.048	.128	.000
1982	.389	.261	.291	.110	.044	.402	.111	.041	.000
1983	.245	.167	.235	.119	.180	.158	.185	.234	.000
1984	.215	.160	.445	.120	.119	.480	.082	.000	.000
1985	.266	.204	.281	.122	.079	.237	.206	.114	.000
1986	.295	.229	.350	.199	.162	.465	.111	.000	1.00
1987	.334	.285	.291	.180	.125	.667	.203	.217	.520
1988	.277	.226	.178	.168	.077	.000	.400	.390	.500
1989	.301	.215	.261	.139	.163	1.00	.000	.000	.000
1990	.239	.144	.243	.086	.087	.813	.232	.000	.000
1991	.153	.123	.175	.092	.109	.308	.162	.000	.000
1992	.126	.092	.110	.028	.000	.000	.000	.000	.000

Source: Same as table 2.

Note: 0S denotes that the number of boys is 0, 1S denotes that the number of boys is 1, and so on and so forth.

Table 6-5. Fertility difference caused by sex composition and its percentage of total fertility rate, 1980-92

Year	China DT	Rural DT	Urban DT	China DT/T	Rural DT/T	Urban DT/T
1980	.198	.220	.111	.072	.075	.058
1981	.188	.221	.062	.073	.080	.038
1982	.236	.270	.078	.095	.099	.054
1983	.202	.237	.052	.089	.093	.040
1984	.166	.201	.049	.079	.084	.041
1985	.146	.173	.042	.066	.070	.033
1986	.206	.240	.055	.086	.091	.041
1987	.172	.198	.035	.070	.074	.025
1988	.187	.220	.021	.081	.085	.016
1989	.162	.192	.062	.073	.078	.046
1990	.186	.218	.061	.090	.094	.050
1991	.122	.167	.018	.071	.086	.016
1992	.090	.131	.016	.065	.085	.016

Source: Same as table 2

Table 6-6. Period parity progression ratios: China, urban and rural, 1955-82

Year	$P_{B\text{-}M}$	$P_{M\text{-}1}$	$P_{1\text{-}2}$	$P_{2\text{-}3}$	$P_{3\text{-}4}$	$P_{4\text{-}5}$	$P_{5\text{-}6}$	$P_{6\text{-}7}$	$P_{7\text{-}8}$	TFR	TFR_m	TFR(2)	
China													
1955	.989	.954	.972	.971	.949	.942	.940	.932	.907	6.470	6.392	6.33	
1956	.994	.945	.965	.948	.941	.933	.929	.931	.873	6.191	6.123	5.98	
1957	.992	.967	.980	.970	.957	.942	.925	.908	.911	6.586	6.518	6.37	
1958	.989	.961	.964	.954	.947	.921	.878	.875	.837	6.076	5.978	5.83	
1959	.980	.910	.921	.904	.882	.840	.810	.756	.693	4.677	4.571	4.27	
1960	.996	.872	.893	.873	.844	.804	.763	.715	.613	4.107	4.073	3.63	
1961	.997	.844	.851	.806	.759	.689	.607	.555	.501	3.210	3.130	2.83	
1962	.999	.981	.982	.966	.941	.903	.843	.774	.715	6.087	5.989	5.78	
1963	.998	.998	.998	.995	.987	.972	.943	.904	.859	7.303	7.267	7.16	
1964	.994	.994	.992	.984	.968	.938	.897	.845	.826	6.739	6.668	6.52	
1965	.994	.990	.987	.977	.941	.904	.862	.801	.726	6.262	6.143	5.96	
1966	.994	.987	.988	.971	.931	.876	.832	.753	.699	5.991	5.832	5.75	
1967	.993	.975	.978	.949	.889	.809	.718	.646	.608	5.205	4.961	4.98	
1968	.998	.991	.990	.968	.923	.851	.795	.725	.660	5.839	5.734	5.68	
1969	.999	.988	.983	.957	.905	.835	.759	.680	.638	5.553	5.418	5.41	
1970	.995	.984	.984	.954	.902	.834	.790	.697	.649	5.556	5.431	5.43	
1971	.987	.982	.982	.944	.872	.816	.745	.665	.584	5.220	4.991	5.08	
1972	.990	.980	.975	.921	.835	.772	.704	.614	.531	4.843	4.630	4.73	
1973	.990	.982	.978	.912	.805	.709	.622	.560	.498	4.549	4.267	4.37	
1974	.990	.989	.981	.883	.763	.645	.567	.513	.427	4.262	3.989	4.14	
1975	.988	.989	.972	.836	.693	.575	.483	.440	.393	3.834	3.606	3.73	
1976	.989	.989	.971	.797	.635	.503	.444	.414	.336	3.574	3.359	3.47	
1977	.993	.990	.963	.753	.563	.465	.389	.361	.318	3.338	3.099	3.23	
1978	.992	.994	.964	.732	.534	.457	.360	.347	.284	3.262	3.071	3.16	
1979	.995	.995	.966	.713	.552	.442	.407	.326	.308	3.268	3.042	3.20	
1980	.999	.992	.920	.585	.437	.330	.280	.270	.287	2.775	2.612	2.70	
1981	.999	.996	.882	.570	.448	.379	.370	.303	.347	2.726	2.495	2.65	
1982	.982	.929	.601	.349	.266	.239	.234	.204	.209	1.719	1.625	___	
Rural													
1955	.993	.955	.976	.974	.953	.945	.941	.941	.915	6.587	6.486	___	
1956	.995	.944	.967	.950	.942	.934	.933	.920	.880	6.216	6.170	___	
1957	.993	.966	.980	.969	.961	.943	.930	.916	.907	6.620	6.379	___	
1958	.990	.960	.963	.953	.949	.921	.882	.888	.856	6.109	5.966	___	
1959	.982	.898	.918	.901	.886	.844	.821	.779	.703	4.654	4.516	___	
1960	.997	.856	.882	.870	.847	.798	.778	.723	.635	4.010	3.982	___	
1961	.999	.835	.847	.809	.760	.688	.618	.561	.500	3.186	3.037	___	
1962	.999	.981	.984	.970	.945	.915	.852	.786	.740	6.204	5.999	___	
1963	.999	.998	.998	.996	.990	.976	.953	.915	.865	7.392	7.298	___	
1964	.996	.995	.994	.989	.978	.955	.916	.868	.849	6.984	6.827	___	
1965	.994	.992	.990	.986	.965	.939	.896	.837	.765	6.662	6.484	___	
1966	.994	.989	.993	.986	.964	.925	.882	.799	.744	6.520	6.275	___	
1967	.991	.976	.984	.973	.937	.873	.774	.690	.651	5.724	5.250	___	
1968	.998	.992	.992	.982	.953	.896	.833	.756	.689	6.241	5.972	___	
1969	.999	.989	.986	.972	.937	.874	.787	.705	.653	5.893	5.623	___	
1970	.996	.985	.987	.974	.936	.877	.816	.718	.668	5.938	5.742	___	
1971	.989	.983	.985	.969	.913	.857	.772	.687	.602	5.608	5.274	___	
1972	.988	.981	.981	.951	.883	.808	.733	.628	.541	5.198	4.798	___	
1973	.989	.983	.983	.947	.855	.751	.649	.582	.511	4.897	4.443	___	

Table 6-6 (continued)

Year	P_{B-M}	P_{M-1}	P_{1-2}	P_{2-3}	P_{3-4}	P_{4-5}	P_{5-6}	P_{6-7}	P_{7-8}	TFR	TFR_m
Rural											
1974	.992	.989	.988	.930	.821	.688	.591	.531	.441	4.632	4.110
1975	.993	.989	.983	.890	.748	.609	.505	.451	.399	4.163	3.727
1976	.994	.990	.984	.869	.681	.531	.457	.422	.340	3.889	3.447
1977	.995	.990	.979	.819	.610	.486	.401	.370	.324	3.595	3.223
1978	.997	.994	.978	.803	.571	.478	.369	.353	.285	3.509	3.224
1979	.997	.995	.981	.775	.589	.461	.416	.332	.309	3.491	3.136
1980	1.00	.994	.959	.656	.467	.344	.286	.275	.290	3.004	2.758
1981	1.00	.996	.947	.636	.474	.392	.377	.309	.349	2.994	2.711
1982	.983	.943	.728	.402	.281	.246	.239	.207	.210	1.974	1.848
Urban											
1955	.972	.949	.954	.957	.927	.923	.929	.812	.844	5.818	5.863
1956	.992	.953	.958	.942	.942	.926	.902	1.00	.850	6.165	6.115
1957	.988	.974	.979	.976	.934	.933	.885	.855	.944	6.372	6.511
1958	.987	.968	.971	.955	.938	.918	.861	.779	.701	5.890	5.644
1959	.979	.953	.937	.915	.862	.809	.748	.597	.634	4.679	4.635
1960	.994	.937	.937	.886	.836	.825	.675	.681	.460	4.475	4.194
1961	.994	.887	.875	.790	.761	.714	.551	.534	.501	3.386	3.184
1962	.999	.981	.970	.942	.915	.804	.778	.686	.530	5.355	5.148
1963	.999	.997	.994	.989	.966	.944	.874	.820	.819	6.748	6.588
1964	.985	.991	.980	.950	.852	.806	.749	.662	.647	5.217	5.125
1965	.997	.983	.963	.889	.710	.580	.597	.519	.423	4.063	3.990
1966	.994	.971	.942	.826	.647	.499	.407	.404	.319	3.505	3.303
1967	1.00	.976	.950	.775	.605	.446	.351	.351	.288	3.349	3.170
1968	.999	.989	.980	.875	.745	.584	.517	.510	.396	4.130	3.942
1969	.998	.985	.967	.856	.720	.557	.524	.438	.494	3.942	3.756
1970	.984	.982	.966	.818	.672	.488	.511	.423	.351	3.628	3.213
1971	.984	.978	.968	.772	.555	.452	.446	.344	.322	3.310	2.948
1972	1.00	.981	.934	.734	.520	.462	.354	.364	.316	3.166	2.967
1973	.993	.984	.949	.700	.493	.337	.267	.190	.214	3.017	2.837
1974	.977	.987	.932	.579	.339	.263	.245	.182	.085	2.620	2.425
1975	.972	.985	.879	.515	.311	.266	.214	.217	.214	2.413	2.261
1976	.987	.982	.872	.397	.305	.192	.207	.181	.062	2.277	2.204
1977	.978	.981	.862	.404	.214	.174	.171	.068	.067	2.207	2.084
1978	.987	.988	.869	.307	.207	.136	.103	.143	.273	2.145	2.071
1979	.989	.988	.836	.269	.173	.138	.159	.044	.373	2.058	1.995
1980	1.00	.978	.647	.102	.094	.069	.029	.000	.000	1.682	1.607
1981	.999	.992	.375	.067	.078	.008	.000	.000	.000	1.389	1.301
1982	1.00	.793	.153	.028	.127	.077	.000	.000	.000	.918	.875

Source: Calculated from 10 percent sub-sample of the 1982 one per-thousand Fertility Sample Survey in China.

Notes: TFR(2) is calculated from the 100 percent sample of the 1982 one per-thousand Fertility Sample Survey in China(Feeney and Yu,1987).

TFR_m is calculated from the lowest Period parity progression ratios of those by sex composition in the same parity for each category of parity.

Table 6-7. Period parity progression ratios based on the surviving children of women: China, urban and rural, 1955-82

Year	P_{B-M}	P_{M-1}	P_{1-2}	P_{2-3}	P_{3-4}	P_{4-5}	P_{5-6}	P_{6-7}	P_{7-8}	TFR	TFR_m
China											
1955	.989	.954	.977	.963	.904	.829	.731	.531	.333	5.051	5.004
1956	.994	.945	.967	.948	.881	.835	.717	.550	.407	4.907	4.879
1957	.992	.967	.984	.959	.912	.864	.786	.638	.478	5.437	5.385
1958	.989	.961	.974	.938	.888	.831	.736	.605	.497	5.055	4.889
1959	.980	.910	.931	.888	.799	.702	.645	.548	.416	3.936	3.881
1960	.996	.872	.907	.842	.759	.691	.612	.485	.354	3.524	3.485
1961	.997	.844	.865	.777	.639	.549	.481	.427	.328	2.844	2.760
1962	.999	.981	.984	.953	.880	.805	.689	.579	.511	5.164	5.065
1963	.998	.998	.999	.992	.966	.920	.833	.751	.658	6.449	6.391
1964	.994	.994	.994	.978	.931	.872	.797	.691	.621	5.922	5.850
1965	.994	.990	.991	.966	.901	.830	.754	.670	.572	5.545	5.449
1966	.994	.987	.991	.962	.890	.816	.739	.648	.625	5.431	5.311
1967	.993	.975	.981	.935	.831	.739	.647	.561	.522	4.743	4.539
1968	.998	.991	.992	.958	.884	.804	.728	.677	.607	5.424	5.278
1969	.999	.988	.987	.948	.865	.777	.692	.649	.619	5.185	5.058
1970	.995	.984	.987	.942	.868	.784	.740	.700	.638	5.249	5.081
1971	.987	.982	.984	.935	.840	.763	.699	.665	.595	4.959	4.727
1972	.990	.980	.975	.916	.801	.716	.660	.614	.553	4.614	4.405
1973	.990	.982	.980	.898	.771	.655	.595	.563	.531	4.351	4.073
1974	.990	.989	.984	.874	.719	.603	.551	.526	.482	4.113	3.860
1975	.988	.989	.973	.829	.648	.526	.459	.440	.408	3.695	3.474
1976	.989	.989	.975	.782	.593	.474	.418	.422	.373	3.468	3.255
1977	.993	.990	.964	.735	.518	.431	.364	.358	.316	3.227	3.003
1978	.992	.994	.966	.712	.488	.402	.364	.325	.309	3.150	2.953
1979	.995	.995	.969	.695	.503	.404	.388	.314	.271	3.161	2.945
1980	.999	.992	.926	.562	.401	.311	.269	.271	.278	2.719	2.549
1981	.999	.996	.884	.554	.409	.362	.345	.333	.315	2.669	2.446
1982	.982	.929	.609	.347	.246	.238	.222	.208	.216	1.722	1.623
Rural											
1955	.993	.955	.981	.965	.902	.829	.709	.521	.301	5.056	4.992
1956	.995	.944	.970	.946	.873	.843	.709	.548	.393	4.892	4.852
1957	.993	.966	.985	.955	.911	.865	.790	.625	.474	5.419	5.345
1958	.990	.960	.973	.935	.883	.837	.733	.605	.471	5.028	4.865
1959	.982	.898	.930	.885	.797	.706	.642	.532	.406	3.873	3.821
1960	.997	.856	.898	.829	.755	.693	.599	.460	.359	3.391	3.365
1961	.999	.835	.866	.776	.627	.538	.473	.416	.308	2.796	2.727
1962	.999	.981	.985	.955	.883	.823	.695	.574	.507	5.220	5.133
1963	.999	.998	.999	.993	.968	.929	.836	.745	.643	6.483	6.429
1964	.996	.995	.996	.983	.945	.900	.801	.694	.622	6.096	6.022
1965	.994	.992	.993	.977	.930	.878	.781	.693	.588	5.874	5.779
1966	.994	.989	.994	.978	.928	.876	.780	.675	.653	5.862	5.743
1967	.991	.976	.986	.960	.881	.806	.684	.589	.539	5.141	4.934
1968	.998	.992	.994	.972	.917	.855	.757	.695	.622	5.765	5.623
1969	.999	.989	.989	.963	.895	.825	.718	.666	.626	5.482	5.348
1970	.996	.985	.990	.961	.899	.835	.766	.723	.659	5.606	5.470
1971	.989	.983	.987	.958	.879	.811	.732	.690	.615	5.329	5.131

Table 6-7 (continued)

Year	P_{B-M}	P_{M-1}	P_{1-2}	P_{2-3}	P_{3-4}	P_{4-5}	P_{5-6}	P_{6-7}	P_{7-8}	TFR	TFR_m
Rural											
1972	.988	.981	.981	.944	.840	.756	.686	.640	.572	4.926	4.702
1973	.989	.983	.985	.932	.810	.698	.620	.593	.555	4.651	4.347
1974	.992	.989	.990	.918	.769	.652	.573	.552	.509	4.446	4.195
1975	.993	.989	.984	.879	.693	.565	.478	.457	.430	3.982	3.751
1976	.994	.990	.987	.846	.628	.506	.434	.438	.387	3.736	3.494
1977	.995	.990	.980	.797	.555	.455	.377	.371	.329	3.450	3.205
1978	.997	.994	.980	.777	.517	.423	.373	.333	.318	3.361	3.143
1979	.997	.995	.983	.755	.535	.425	.396	.323	.275	3.358	3.120
1980	1.00	.994	.964	.629	.426	.329	.276	.277	.282	2.928	2.733
1981	1.00	.996	.947	.616	.428	.377	.353	.339	.320	2.911	2.679
1982	.983	.943	.740	.393	.257	.248	.226	.212	.218	1.974	1.855
Urban											
1955	.972	.949	.953	.952	.916	.914	.889	.572	.556	5.283	5.234
1956	.992	.953	.961	.957	.912	.847	.765	.570	.510	5.144	5.018
1957	.988	.974	.982	.974	.909	.921	.736	.715	.549	5.630	5.568
1958	.987	.968	.978	.953	.914	.911	.749	.606	.701	5.463	5.092
1959	.979	.953	.942	.896	.809	.780	.663	.652	.508	4.387	4.122
1960	.994	.937	.944	.899	.771	.775	.673	.640	.319	4.269	4.063
1961	.994	.887	.872	.775	.704	.695	.520	.504	.470	3.221	2.986
1962	.999	.981	.972	.944	.862	.778	.655	.608	.535	4.974	4.638
1963	.999	.997	.996	.989	.952	.916	.822	.784	.755	6.430	6.187
1964	.985	.991	.982	.944	.825	.777	.780	.679	.622	5.117	4.870
1965	.997	.983	.970	.869	.684	.609	.566	.473	.425	3.992	3.877
1966	.994	.971	.952	.818	.615	.531	.403	.434	.315	3.499	3.351
1967	1.00	.976	.953	.769	.536	.458	.390	.319	.425	3.280	3.075
1968	.999	.989	.980	.874	.696	.607	.501	.521	.479	4.066	3.816
1969	.998	.985	.970	.848	.686	.566	.514	.491	.583	3.901	3.651
1970	.984	.982	.966	.809	.649	.490	.525	.449	.315	3.586	3.158
1971	.984	.978	.964	.759	.523	.501	.380	.367	.317	3.251	2.856
1972	1.00	.981	.933	.728	.515	.509	.358	.334	.295	3.170	2.928
1973	.993	.984	.950	.684	.476	.388	.264	.190	.241	2.998	2.800
1974	.977	.987	.931	.577	.323	.261	.274	.220	.071	2.606	2.388
1975	.972	.985	.881	.507	.288	.277	.224	.208	.086	2.395	2.234
1976	.987	.982	.870	.392	.302	.226	.161	.199	.208	2.270	2.182
1977	.978	.981	.867	.374	.201	.205	.162	.078	.071	2.180	2.040
1978	.987	.988	.874	.294	.187	.190	.069	.191	.167	2.135	2.051
1979	.989	.988	.842	.262	.142	.185	.173	.000	.375	2.053	1.987
1980	1.00	.978	.646	.101	.106	.000	.029	.000	.000	1.680	1.613
1981	.999	.992	.391	.073	.088	.016	.000	.000	.000	1.409	1.331
1982	1.00	.793	.144	.023	.152	.200	.000	.000	.000	.910	.867

Source: Same as table 6

Note: TFR_m is calculated from the lowest Period parity progression ratios of those by sex composition in the same parity for each category of parity.

Table 8. Period parity progression ratios by sex composition of children ever born: China, urban and rural, 1955-82

Year	P_{1-2}	P_{1-2}	P_{2-3}	P_{2-3}	P_{2-3}	P_{3-4}	P_{3-4}	P_{3-4}	P_{3-4}	P_{4-5}	P_{4-5}	P_{4-5}	P_{4-5}	P_{4-5}	P_{5-6}	P_{5-6}	P_{5-6}	P_{5-6}	P_{5-6}	P_{5-6}
	0S	1S	0S	1S	2S	0S	1S	2S	3S	0S	1S	2S	3S	4S	0S	1S	2S	3S	4S	5S
China																				
1955	.977	.968	.980	.963	.976	.976	.951	.940	.943	1.00	.950	.944	.926	.954	.866	.930	.944	.945	.952	.892
1956	.970	.960	.961	.950	.934	.945	.956	.931	.932	.944	.945	.935	.919	.944	.928	.940	.949	.920	.935	.918
1957	.985	.974	.964	.972	.970	.979	.953	.958	.960	.963	.967	.924	.935	.963	.984	.968	.882	.929	.929	.957
1958	.972	.958	.970	.948	.949	.971	.953	.936	.939	.946	.939	.913	.902	.933	.904	.851	.859	.888	.904	.876
1959	.933	.911	.915	.908	.889	.886	.900	.855	.898	.955	.848	.839	.825	.773	.907	.867	.803	.803	.787	.784
1960	.894	.891	.893	.871	.860	.884	.848	.825	.861	.750	.776	.811	.822	.781	.587	.791	.754	.772	.750	.757
1961	.851	.848	.853	.782	.813	.885	.748	.745	.750	.813	.713	.687	.657	.705	.680	.659	.594	.603	.623	.625
1962	.984	.981	.976	.961	.968	.953	.945	.932	.944	.940	.902	.894	.899	.941	.930	.852	.840	.833	.852	.897
1963	.999	.997	.997	.995	.994	.992	.988	.986	.986	.993	.980	.967	.963	.976	.980	.952	.929	.940	.962	.952
1964	.995	.990	.991	.982	.984	.978	.973	.961	.968	.970	.949	.932	.936	.930	.925	.936	.884	.895	.884	.891
1965	.988	.985	.990	.967	.980	.968	.940	.928	.952	.927	.932	.890	.886	.924	.878	.878	.856	.872	.831	.833
1966	.989	.987	.982	.965	.973	.952	.945	.910	.931	.950	.901	.855	.867	.877	.833	.894	.839	.827	.788	.784
1967	.982	.974	.976	.941	.937	.959	.897	.864	.877	.944	.862	.765	.781	.832	.916	.785	.725	.677	.740	.820
1968	.993	.988	.983	.962	.966	.973	.929	.907	.899	.928	.886	.842	.822	.822	.843	.845	.783	.795	.766	.827
1969	.985	.983	.972	.955	.948	.954	.925	.879	.879	.870	.872	.828	.797	.863	.933	.818	.763	.733	.758	.795
1970	.988	.980	.982	.944	.944	.955	.911	.883	.892	.921	.845	.832	.805	.845	.876	.805	.781	.784	.800	.843
1971	.986	.979	.966	.928	.954	.949	.878	.844	.869	.913	.845	.783	.805	.834	.859	.813	.740	.726	.733	.749
1972	.976	.975	.966	.908	.905	.914	.856	.799	.807	.862	.816	.732	.762	.790	.876	.747	.699	.684	.704	.791
1973	.983	.973	.961	.899	.889	.915	.840	.740	.796	.857	.760	.676	.667	.731	.864	.732	.640	.567	.631	.653
1974	.987	.976	.968	.855	.848	.909	.787	.707	.735	.887	.714	.587	.599	.657	.776	.628	.585	.546	.531	.488
1975	.976	.968	.930	.811	.802	.883	.710	.625	.673	.860	.632	.526	.518	.593	.769	.610	.441	.454	.487	.485
1976	.973	.969	.911	.766	.753	.847	.662	.565	.549	.827	.575	.441	.457	.450	.669	.517	.467	.414	.396	.459
1977	.970	.956	.883	.714	.712	.825	.598	.469	.486	.790	.525	.399	.412	.471	.671	.452	.422	.349	.350	.401
1978	.969	.960	.865	.694	.689	.799	.539	.456	.479	.752	.530	.412	.357	.430	.754	.448	.327	.327	.343	.317
1979	.968	.964	.872	.667	.653	.834	.575	.457	.486	.695	.496	.381	.404	.444	.750	.484	.385	.376	.359	.371
1980	.936	.906	.766	.546	.502	.696	.460	.348	.371	.589	.378	.277	.282	.252	.511	.319	.292	.239	.274	.281
1981	.925	.835	.773	.520	.484	.676	.470	.368	.374	.633	.418	.330	.350	.228	.669	.438	.334	.347	.326	.352
1982	.659	.555	.520	.315	.291	.454	.262	.234	.215	.410	.288	.202	.194	.187	.420	.281	.207	.230	.204	.141
Rural																				
1955	.981	.972	.982	.964	.979	1.00	.958	.944	.923	1.00	.958	.944	.923	.959	.876	.934	.944	.945	.951	.890
1956	.973	.962	.964	.951	.936	.940	.948	.935	.920	.940	.948	.935	.920	.933	.916	.947	.944	.933	.927	.921
1957	.986	.974	.964	.970	.971	.965	.971	.923	.935	.965	.971	.923	.935	.966	1.00	.977	.894	.929	.936	.961
1958	.971	.958	.970	.946	.951	.933	.942	.920	.894	.933	.942	.920	.894	.931	.894	.841	.859	.892	.909	.847
1959	.932	.906	.915	.906	.881	.950	.843	.847	.831	.950	.843	.847	.831	.782	.834	.896	.824	.810	.797	.770
1960	.878	.884	.874	.876	.855	.750	.777	.809	.803	.750	.777	.809	.803	.791	.575	.791	.763	.790	.762	.765
1961	.843	.848	.858	.785	.811	.788	.702	.688	.661	.788	.702	.688	.661	.734	.678	.663	.608	.611	.642	.664
1962	.984	.983	.977	.967	.970	.941	.915	.907	.914	.941	.915	.907	.914	.951	.938	.864	.860	.834	.866	.912
1963	.999	.998	.997	.996	.995	.995	.986	.973	.966	.995	.986	.973	.966	.976	.987	.962	.937	.950	.969	.962
1964	.996	.992	.993	.988	.988	.974	.962	.950	.953	.974	.962	.950	.953	.950	.954	.946	.909	.912	.910	.916
1965	.992	.988	.995	.978	.989	.953	.960	.931	.926	.953	.960	.931	.926	.950	.856	.910	.896	.908	.856	.868
1966	.993	.992	.989	.983	.987	.970	.938	.914	.921	.970	.938	.914	.921	.909	.889	.938	.893	.877	.842	.829
1967	.987	.980	.989	.969	.966	.961	.915	.836	.854	.961	.915	.836	.854	.891	.953	.846	.788	.733	.792	.855
1968	.994	.991	.990	.980	.981	.963	.924	.886	.875	.963	.924	.886	.875	.876	.891	.873	.829	.834	.796	.858
1969	.987	.985	.986	.973	.960	.881	.912	.869	.838	.881	.912	.869	.838	.902	.952	.857	.796	.760	.785	.819
1970	.990	.983	.987	.971	.967	.950	.879	.884	.849	.950	.879	.884	.849	.871	.884	.832	.814	.809	.820	.863
1971	.987	.982	.979	.963	.972	.930	.886	.836	.841	.930	.886	.836	.841	.865	.878	.843	.769	.753	.758	.781
1972	.980	.981	.979	.946	.938	.896	.855	.772	.791	.896	.855	.772	.791	.821	.885	.800	.728	.709	.731	.822
1973	.989	.977	.980	.940	.926	.868	.804	.722	.710	.868	.804	.722	.710	.778	.911	.767	.665	.592	.659	.693
1974	.992	.984	.982	.918	.899	.921	.762	.635	.639	.921	.762	.635	.639	.691	.812	.662	.614	.566	.553	.521
1975	.985	.981	.966	.872	.848	.910	.669	.562	.542	.910	.669	.562	.542	.625	.794	.655	.464	.471	.503	.508
1976	.987	.981	.959	.846	.826	.876	.612	.469	.481	.876	.612	.469	.481	.470	.714	.551	.487	.419	.407	.478
1977	.985	.973	.931	.785	.786	.847	.542	.424	.428	.847	.542	.424	.428	.473	.704	.471	.440	.359	.354	.412
1978	.982	.975	.926	.766	.768	.795	.555	.433	.374	.795	.555	.433	.374	.444	.754	.455	.339	.336	.352	.329
1979	.983	.979	.924	.736	.708	.726	.521	.397	.421	.726	.521	.397	.421	.465	.766	.500	.392	.384	.366	.381
1980	.969	.950	.843	.621	.563	.632	.391	.288	.293	.632	.391	.288	.293	.262	.522	.332	.300	.244	.281	.289
1981	.974	.912	.847	.586	.544	.657	.434	.341	.362	.657	.434	.341	.362	.233	.689	.453	.340	.353	.331	.360
1982	.791	.680	.616	.365	.327	.431	.299	.207	.200	.431	.299	.207	.200	.193	.425	.288	.211	.234	.207	.142

Table 8 (continued)

Year	P_{1-2} 0S	P_{1-2} 1S	P_{2-3} 0S	P_{2-3} 1S	P_{2-3} 2S	P_{3-4} 0S	P_{3-4} 1S	P_{3-4} 2S	P_{3-4} 3S	P_{4-5} 0S	P_{4-5} 1S	P_{4-5} 2S	P_{4-5} 3S	P_{4-5} 4S	P_{5-6} 0S	P_{5-6} 1S	P_{5-6} 2S	P_{5-6} 3S	P_{5-6} 4S	P_{5-6} 5S
Urban																				
1955	.962	.946	.942	.959	.957	.950	.957	.914	.922	.848	.862	.959	.921	.871	1.00	.860	.929	.946	.916	.906
1956	.961	.956	.954	.950	.918	.962	.907	.961	1.00	.922	.915	.929	.935	1.00	1.00	.858	.937	.831	.967	1.00
1957	.979	.979	.976	.981	.964	.916	.933	.934	.965	.936	.941	.934	.917	.934	.837	.815	.792	.938	.870	.920
1958	.981	.963	.979	.955	.947	.944	.957	.902	.930	1.00	.928	.861	.936	.940	.917	.837	.861	.892	.891	1.00
1959	.941	.935	.910	.919	.912	.939	.878	.860	.832	.949	.861	.769	.787	.756	1.00	.747	.665	.772	.660	1.00
1960	.950	.925	.939	.850	.909	.924	.834	.795	.831	.698	.755	.817	.920	.788	.577	.791	.672	.644	.668	.629
1961	.887	.863	.812	.759	.828	.896	.811	.680	.831	.933	.681	.721	.633	.581	.438	.653	.511	.564	.545	.340
1962	.979	.962	.984	.919	.947	.866	.959	.874	.897	.887	.795	.805	.748	.865	1.00	.836	.695	.794	.722	.743
1963	.997	.991	.996	.985	.990	.994	.969	.951	.960	.957	.926	.932	.952	.989	1.00	.869	.883	.860	.906	.852
1964	.985	.976	.969	.945	.963	.925	.868	.828	.841	.949	.865	.792	.751	.609	.715	.854	.706	.778	.635	.711
1965	.958	.970	.895	.906	.867	.823	.687	.669	.726	.670	.691	.553	.495	.540	1.00	.673	.545	.547	.690	.529
1966	.945	.939	.922	.786	.834	.787	.702	.617	.511	.793	.676	.393	.340	.570	.563	.457	.390	.405	.414	.363
1967	.955	.940	.868	.755	.733	.917	.582	.528	.503	1.00	.491	.410	.308	.373	.695	.469	.336	.315	.347	.595
1968	.988	.974	.948	.845	.878	.925	.785	.685	.690	.713	.666	.600	.463	.343	.669	.680	.469	.502	.514	.571
1969	.969	.963	.878	.839	.868	.914	.747	.637	.682	.770	.634	.558	.412	.527	.800	.544	.490	.521	.429	.524
1970	.972	.962	.960	.764	.773	.882	.706	.528	.721	.704	.609	.342	.433	.679	.832	.576	.440	.517	.474	.640
1971	.980	.962	.886	.672	.836	.753	.576	.454	.588	.831	.497	.341	.406	.509	.727	.531	.434	.423	.410	.000
1972	.948	.927	.882	.673	.735	.809	.468	.485	.451	.614	.486	.382	.527	.560	.825	.251	.447	.324	.247	.286
1973	.943	.955	.806	.655	.697	.663	.588	.380	.432	.736	.397	.296	.219	.291	.386	.400	.307	.176	.184	.200
1974	.955	.913	.845	.501	.511	.631	.344	.270	.285	.533	.379	.134	.214	.331	.608	.264	.193	.237	.263	.000
1975	.884	.872	.641	.449	.549	.533	.343	.208	.285	.502	.346	.162	.264	.297	.614	.131	.146	.229	.281	.333
1976	.853	.888	.586	.339	.341	.472	.339	.237	.227	.479	.208	.141	.150	.080	.250	.185	.121	.310	.198	.000
1977	.871	.854	.636	.327	.339	.456	.259	.132	.101	.224	.291	.061	.151	.280	.250	.283	.102	.091	.313	.000
1978	.884	.849	.432	.290	.225	.531	.145	.107	.283	.294	.208	.075	.018	.200	1.00	.319	.059	.000	.050	.000
1979	.823	.840	.423	.210	.265	.282	.167	.135	.165	.427	.174	.056	.019	.143	.400	.267	.209	.000	.040	.000
1980	.694	.603	.175	.063	.113	.215	.102	.041	.000	.000	.150	.063	.000	.000	1.00	.000	.000	.000	.000	.000
1981	.463	.297	.154	.051	.043	.043	.072	.024	.333	.077	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1982	.214	.102	.053	.011	.061	.045	.071	.343	.000	.333	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Source: Same as table 6

Table 9. Period parity progression ratios by sex composition of the surviving children of women: China, urban and rural, 1955-82

Year	P_{1-2}	P_{1-2}	P_{2-3}	P_{2-3}	P_{2-3}	P_{3-4}	P_{3-4}	P_{3-4}	P_{3-4}	P_{4-5}	P_{4-5}	P_{4-5}	P_{4-5}	P_{4-5}	P_{5-6}	P_{5-6}	P_{5-6}	P_{5-6}	P_{5-6}	P_{5-6}
	0S	1S	0S	1S	2S	0S	1S	2S	3S	0S	1S	2S	3S	4S	0S	1S	2S	3S	4S	5S
China																				
1955	.983	.971	.967	.957	.969	.915	.920	.892	.887	.886	.838	.834	.803	.842	.893	.726	.694	.748	.693	.753
1956	.969	.965	.969	.944	.936	.919	.894	.868	.859	.880	.854	.845	.794	.852	.559	.715	.721	.725	.712	.660
1957	.988	.979	.963	.964	.947	.941	.910	.903	.918	.960	.879	.855	.843	.853	.908	.852	.767	.784	.738	.818
1958	.982	.965	.956	.936	.925	.887	.900	.874	.895	.933	.839	.802	.830	.877	.925	.798	.745	.707	.786	.634
1959	.945	.921	.911	.885	.873	.814	.821	.786	.769	.807	.720	.708	.668	.675	.842	.656	.619	.647	.644	.712
1960	.912	.902	.859	.837	.838	.721	.761	.752	.792	.671	.701	.693	.678	.734	.660	.681	.633	.605	.576	.517
1961	.868	.860	.851	.749	.764	.736	.632	.618	.647	.645	.574	.536	.518	.565	.610	.518	.469	.490	.432	.380
1962	.984	.983	.972	.945	.952	.906	.884	.865	.895	.888	.823	.791	.785	.832	.717	.709	.703	.686	.663	.678
1963	.999	.998	.995	.992	.991	.981	.968	.962	.952	.956	.936	.915	.904	.930	.905	.829	.833	.820	.876	.811
1964	.996	.992	.985	.977	.976	.950	.937	.927	.917	.903	.879	.862	.869	.889	.880	.854	.786	.784	.791	.834
1965	.993	.989	.980	.955	.971	.946	.900	.881	.917	.920	.836	.833	.801	.842	.866	.781	.752	.758	.695	.801
1966	.990	.991	.976	.959	.955	.943	.902	.868	.883	.924	.849	.793	.796	.820	.842	.829	.726	.739	.695	.640
1967	.986	.977	.966	.925	.922	.916	.852	.794	.807	.901	.785	.700	.708	.745	.717	.722	.642	.631	.646	.632
1968	.994	.989	.979	.950	.952	.958	.896	.855	.865	.883	.841	.789	.776	.782	.786	.769	.714	.734	.678	.768
1969	.988	.985	.967	.945	.939	.911	.883	.842	.849	.847	.809	.771	.740	.796	.818	.746	.707	.662	.698	.708
1970	.990	.984	.974	.931	.932	.923	.881	.841	.864	.855	.819	.772	.742	.823	.866	.778	.731	.724	.741	.827
1971	.987	.982	.962	.919	.938	.918	.854	.805	.837	.888	.796	.732	.755	.727	.819	.781	.699	.670	.717	.643
1972	.975	.975	.960	.902	.905	.900	.819	.758	.789	.844	.773	.683	.684	.687	.855	.735	.655	.634	.632	.769
1973	.985	.975	.954	.885	.867	.874	.810	.701	.766	.812	.731	.615	.603	.639	.834	.679	.610	.541	.599	.697
1974	.988	.979	.963	.847	.835	.874	.748	.660	.669	.866	.660	.549	.558	.608	.800	.589	.572	.535	.488	.534
1975	.976	.969	.924	.801	.797	.869	.657	.582	.601	.830	.601	.467	.458	.520	.785	.583	.420	.433	.415	.496
1976	.976	.974	.896	.749	.733	.830	.622	.513	.518	.782	.521	.418	.431	.483	.728	.494	.445	.380	.352	.455
1977	.969	.959	.878	.692	.687	.804	.556	.417	.433	.728	.481	.377	.380	.409	.707	.400	.368	.331	.352	.346
1978	.970	.962	.853	.672	.664	.779	.507	.392	.422	.727	.461	.359	.300	.355	.737	.473	.317	.327	.363	.327
1979	.971	.967	.871	.645	.620	.802	.520	.409	.429	.650	.472	.340	.348	.387	.738	.488	.360	.351	.361	.263
1980	.942	.912	.759	.520	.470	.663	.435	.294	.333	.585	.355	.252	.263	.241	.492	.311	.281	.229	.249	.264
1981	.928	.835	.762	.505	.459	.666	.415	.331	.318	.666	.389	.304	.323	.256	.639	.385	.336	.319	.282	.355
1982	.673	.558	.519	.316	.278	.458	.239	.203	.203	.385	.288	.192	.219	.117	.405	.242	.220	.221	.164	.158
Rural																				
1955	.987	.975	.971	.957	.972	.914	.913	.895	.879	.868	.844	.829	.792	.830	.872	.720	.684	.713	.677	.738
1956	.972	.968	.970	.941	.937	.910	.889	.858	.854	.864	.861	.846	.791	.856	.500	.689	.710	.724	.694	.666
1957	.990	.979	.958	.961	.942	.941	.908	.901	.920	.960	.885	.852	.827	.828	.898	.850	.784	.780	.759	.794
1958	.982	.965	.950	.933	.926	.875	.895	.871	.895	.930	.837	.807	.812	.886	.930	.815	.734	.699	.780	.672
1959	.946	.917	.906	.883	.872	.776	.821	.790	.770	.741	.696	.714	.670	.658	.642	.653	.625	.639	.668	.711
1960	.902	.895	.829	.831	.826	.705	.760	.751	.784	.617	.682	.683	.677	.751	.587	.671	.623	.588	.574	.535
1961	.868	.862	.852	.752	.752	.712	.612	.614	.639	.590	.564	.523	.485	.563	.609	.504	.487	.475	.417	.431
1962	.985	.984	.969	.950	.953	.913	.882	.870	.899	.893	.830	.803	.798	.841	.678	.688	.710	.700	.655	.707
1963	.999	.998	.994	.993	.991	.981	.970	.967	.954	.965	.937	.922	.908	.931	.894	.834	.836	.823	.876	.835
1964	.997	.994	.988	.982	.980	.954	.950	.944	.933	.910	.895	.885	.889	.915	.890	.852	.795	.790	.794	.837
1965	.995	.992	.987	.967	.981	.957	.930	.916	.945	.941	.870	.872	.841	.888	.844	.819	.781	.786	.715	.810
1966	.994	.995	.985	.977	.972	.966	.932	.913	.931	.954	.888	.847	.855	.852	.870	.859	.777	.777	.740	.674
1967	.990	.982	.979	.954	.953	.928	.901	.852	.867	.925	.836	.764	.767	.798	.742	.760	.686	.666	.684	.666
1968	.996	.992	.985	.969	.965	.970	.924	.897	.902	.917	.880	.827	.823	.819	.803	.787	.754	.759	.708	.796
1969	.991	.988	.979	.964	.950	.930	.910	.875	.893	.855	.847	.814	.774	.833	.830	.785	.742	.680	.720	.739
1970	.993	.987	.978	.956	.955	.930	.911	.884	.881	.875	.855	.820	.779	.852	.875	.805	.760	.749	.769	.850
1971	.989	.986	.971	.952	.958	.944	.887	.853	.874	.896	.836	.779	.786	.745	.838	.810	.731	.704	.750	.669
1972	.979	.982	.971	.937	.934	.918	.864	.794	.836	.873	.802	.720	.703	.710	.870	.781	.680	.656	.661	.806
1973	.990	.979	.971	.924	.906	.901	.845	.745	.816	.826	.759	.651	.634	.675	.868	.712	.643	.563	.621	.726
1974	.993	.987	.976	.903	.883	.905	.797	.716	.725	.894	.696	.591	.590	.643	.824	.616	.603	.553	.509	.560
1975	.985	.982	.957	.858	.843	.907	.699	.633	.643	.872	.633	.498	.482	.540	.815	.625	.443	.447	.432	.515
1976	.990	.985	.940	.821	.801	.874	.662	.544	.549	.818	.546	.442	.453	.504	.764	.528	.467	.391	.362	.481
1977	.984	.977	.923	.758	.753	.852	.593	.451	.469	.781	.490	.401	.392	.415	.742	.423	.385	.342	.356	.356
1978	.982	.978	.911	.737	.733	.812	.539	.422	.450	.745	.484	.374	.314	.360	.747	.486	.330	.336	.370	.337
1979	.985	.982	.917	.711	.674	.850	.557	.434	.457	.675	.492	.354	.361	.400	.760	.496	.371	.358	.368	.274
1980	.975	.954	.833	.587	.529	.706	.462	.313	.358	.622	.371	.263	.272	.249	.504	.325	.290	.234	.256	.271
1981	.976	.910	.834	.568	.513	.708	.432	.348	.333	.691	.404	.313	.332	.262	.663	.402	.343	.324	.288	.366
1982	.809	.688	.605	.360	.310	.495	.250	.211	.211	.398	.299	.197	.224	.120	.416	.251	.223	.224	.167	.160

Table 9 (continued)

Year	P_{1-2} 0S	P_{1-2} 1S	P_{2-3} 0S	P_{2-3} 1S	P_{2-3} 2S	P_{3-4} 0S	P_{3-4} 1S	P_{3-4} 2S	P_{3-4} 3S	P_{4-5} 0S	P_{4-5} 1S	P_{4-5} 2S	P_{4-5} 3S	P_{4-5} 4S	P_{5-6} 0S	P_{5-6} 1S	P_{5-6} 2S	P_{5-6} 3S	P_{5-6} 4S	P_{5-6} 5S
Urban																				
1955	.956	.949	.951	.961	.952	.919	.949	.875	.929	1.00	.780	.874	.849	.834	1.00	.714	.811	1.00	.830	.733
1956	.962	.959	.961	.961	.942	.937	.909	.909	.877	.856	.753	.829	.815	.864	.733	1.00	.756	.693	.810	1.00
1957	.984	.981	.975	.973	.967	.927	.911	.908	.875	1.00	.819	.859	.916	.927	.848	.880	.631	.790	.510	.795
1958	.986	.971	.977	.949	.927	.930	.925	.903	.888	.913	.861	.767	.906	.800	.429	.553	.791	.746	.891	.552
1959	.948	.935	.930	.885	.898	.946	.819	.763	.799	.932	.820	.663	.651	.744	1.00	.671	.561	.730	.500	.715
1960	.954	.936	.956	.864	.899	.784	.760	.747	.883	.864	.746	.736	.662	.590	1.00	.699	.661	.694	.540	.391
1961	.878	.863	.834	.721	.816	.874	.742	.659	.680	.885	.606	.597	.656	.644	.625	.563	.381	.580	.526	.050
1962	.977	.971	.992	.912	.943	.847	.895	.837	.850	.849	.791	.719	.718	.766	.885	.802	.652	.584	.699	.417
1963	.998	.992	.994	.984	.992	.988	.951	.930	.942	.888	.929	.877	.882	.919	.966	.813	.831	.814	.894	.618
1964	.987	.978	.957	.934	.958	.924	.842	.796	.781	.870	.779	.719	.700	.583	.734	.858	.750	.772	.772	.712
1965	.973	.972	.886	.885	.836	.877	.678	.626	.696	.811	.625	.565	.490	.444	1.00	.489	.601	.552	.686	.804
1966	.961	.945	.902	.798	.799	.690	.691	.567	.478	.682	.585	.493	.321	.576	.700	.586	.364	.405	.280	.286
1967	.959	.944	.884	.748	.689	.851	.559	.456	.443	1.00	.467	.364	.343	.446	.663	.474	.375	.359	.472	.392
1968	.988	.976	.951	.840	.882	.916	.753	.605	.670	.713	.619	.600	.454	.373	.731	.650	.427	.518	.477	.440
1969	.971	.969	.892	.826	.860	.807	.740	.615	.582	.799	.567	.466	.496	.463	.860	.480	.433	.546	.486	.500
1970	.972	.962	.947	.753	.755	.866	.673	.502	.721	.704	.559	.338	.345	.662	.849	.561	.560	.489	.463	.657
1971	.976	.961	.894	.659	.805	.711	.572	.405	.526	.864	.462	.327	.436	.552	.688	.579	.408	.266	.355	.250
1972	.951	.922	.894	.665	.730	.770	.457	.476	.497	.555	.510	.358	.504	.328	1.00	.221	.441	.353	.178	.314
1973	.944	.955	.808	.645	.667	.633	.575	.359	.433	.721	.474	.263	.211	.235	.386	.365	.210	.216	.231	.333
1974	.956	.909	.844	.495	.507	.628	.347	.229	.252	.474	.337	.103	.164	.190	.571	.343	.180	.275	.280	.000
1975	.890	.868	.641	.443	.533	.504	.310	.178	.312	.460	.339	.131	.209	.318	.603	.137	.124	.358	.102	.000
1976	.854	.884	.590	.332	.337	.489	.340	.226	.206	.491	.220	.091	.217	.074	.344	.151	.080	.221	.105	.000
1977	.882	.853	.602	.291	.325	.427	.265	.099	.088	.202	.299	.025	.155	.259	.333	.167	.115	.100	.331	.000
1978	.894	.850	.410	.271	.230	.498	.151	.090	.180	.491	.151	.088	.000	.271	.167	.274	.000	.000	.034	.000
1979	.833	.844	.451	.199	.232	.232	.130	.120	.156	.413	.215	.053	.019	.053	.400	.373	.186	.000	.056	.000
1980	.685	.608	.167	.068	.124	.223	.135	.009	.000	.000	.000	.000	.000	.000	1.00	.000	.000	.000	.000	.000
1981	.462	.327	.154	.049	.075	.043	.081	.019	.500	.077	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1982	.207	.092	.053	.011	.041	.045	.080	.508	.000	.500	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Source: Same as table 6

Table 10. Fertility difference caused by sex composition and its percentage of total fertility rate, 1955-82

Year	China DT	Rural DT	Urban DT	China DT/T	Rural DT/T	Urban DT/T
1955	.047	.064	.048	.007	.010	.008
1956	.028	.040	.125	.004	.006	.020
1957	.052	.074	.062	.008	.011	.010
1958	.166	.163	.371	.027	.027	.063
1959	.055	.052	.264	.012	.011	.056
1960	.039	.025	.206	.009	.006	.046
1961	.085	.069	.235	.026	.022	.069
1962	.099	.086	.336	.016	.014	.063
1963	.059	.054	.243	.008	.007	.036
1964	.072	.074	.247	.011	.011	.047
1965	.096	.095	.115	.015	.014	.028
1966	.120	.118	.148	.020	.018	.042
1967	.204	.207	.205	.039	.036	.061
1968	.146	.142	.250	.025	.023	.061
1969	.127	.134	.250	.023	.023	.063
1970	.168	.136	.427	.030	.023	.118
1971	.232	.198	.395	.044	.035	.119
1972	.209	.224	.242	.043	.043	.077
1973	.278	.304	.198	.061	.062	.066
1974	.253	.251	.218	.059	.054	.083
1975	.221	.231	.161	.058	.055	.067
1976	.213	.243	.088	.059	.062	.039
1977	.224	.245	.140	.067	.068	.063
1978	.196	.217	.084	.060	.062	.039
1979	.215	.239	.066	.066	.068	.032
1980	.170	.194	.067	.061	.065	.040
1981	.223	.232	.078	.082	.077	.056
1982	.100	.119	.043	.058	.060	.047

Source: Same as table 6

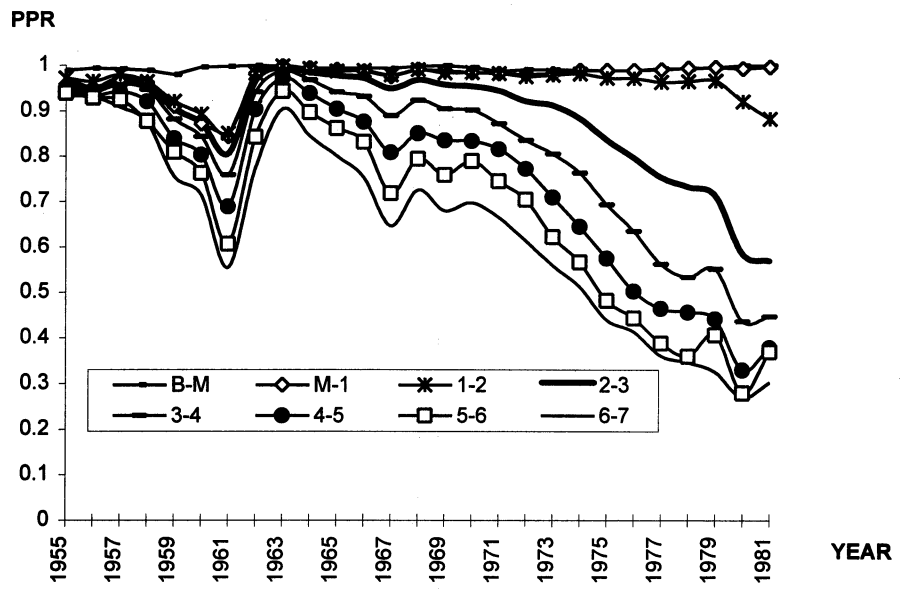

Figure 1. Period parity progression ratios for China,1955-81
Source: Calculated from 10 percent subsample of 1982 one-per-thousand National Fertility Survey

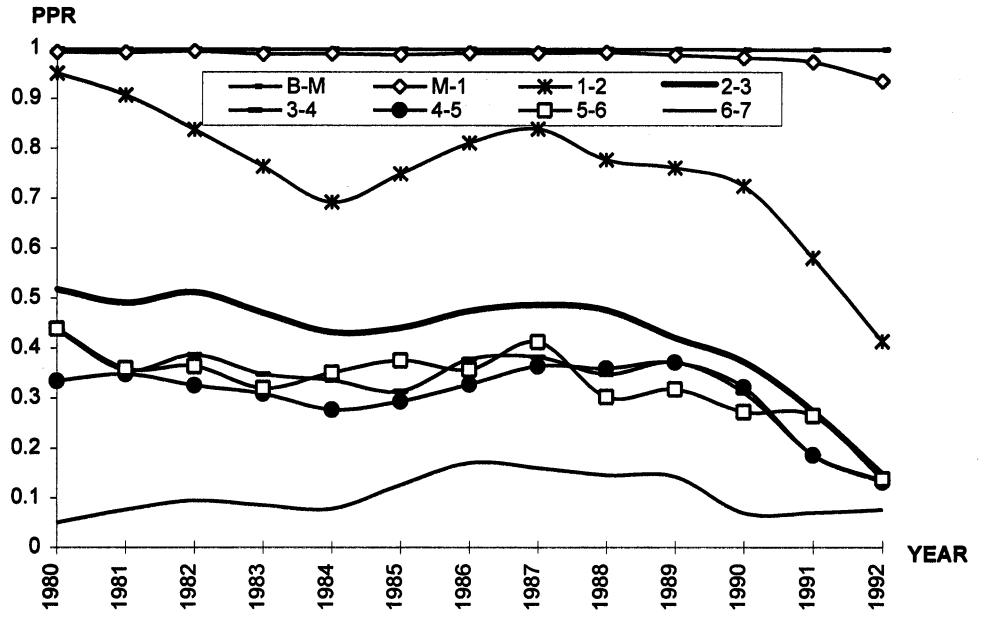

Figure 2. Period parity progression ratios for China,1980-92
Source: Calculated from 1992 Fertility Sample Survey in China

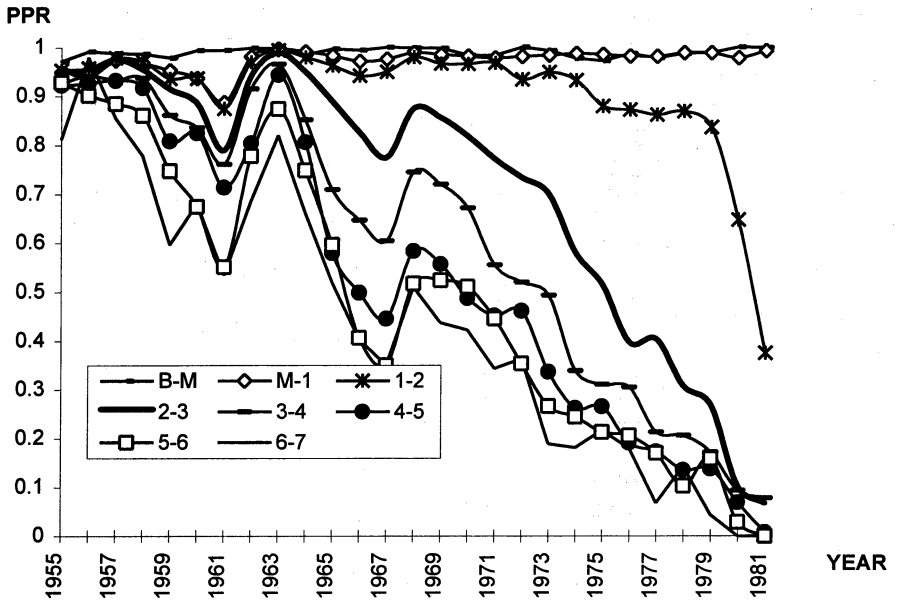

Figure 3. Period parity progression ratios for urban China,1955-81

Source: Same as figure 1

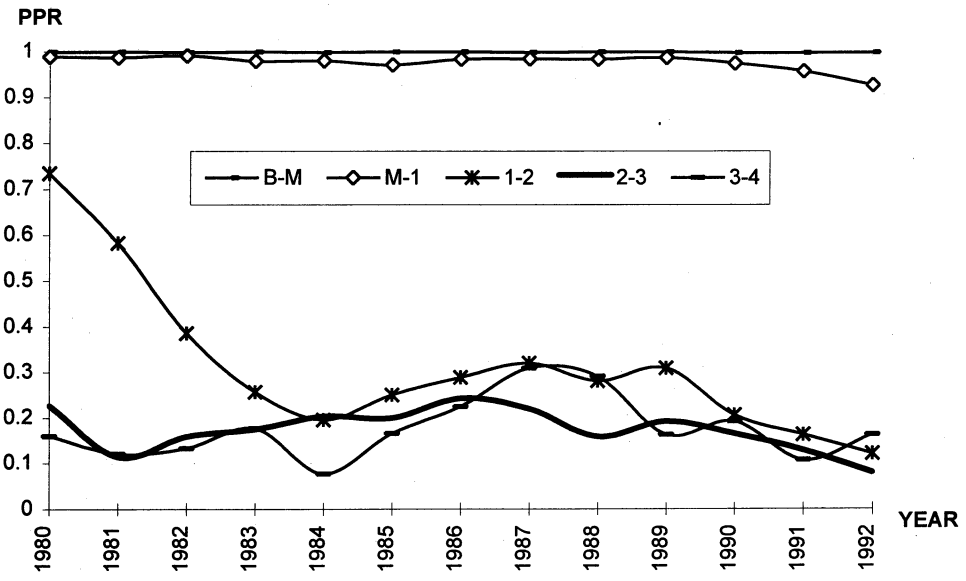

Figure 4. Period parity progression ratios for urban China,1980-92

Source: Same as figure 2

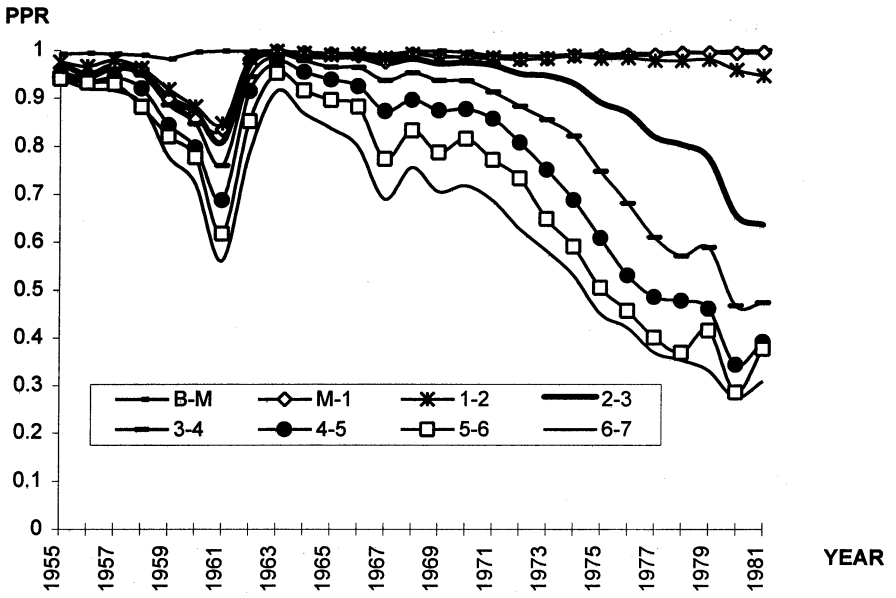

Figure 5. Period parity progression ratios for rural China,1955-81

Source: Same as figure 1

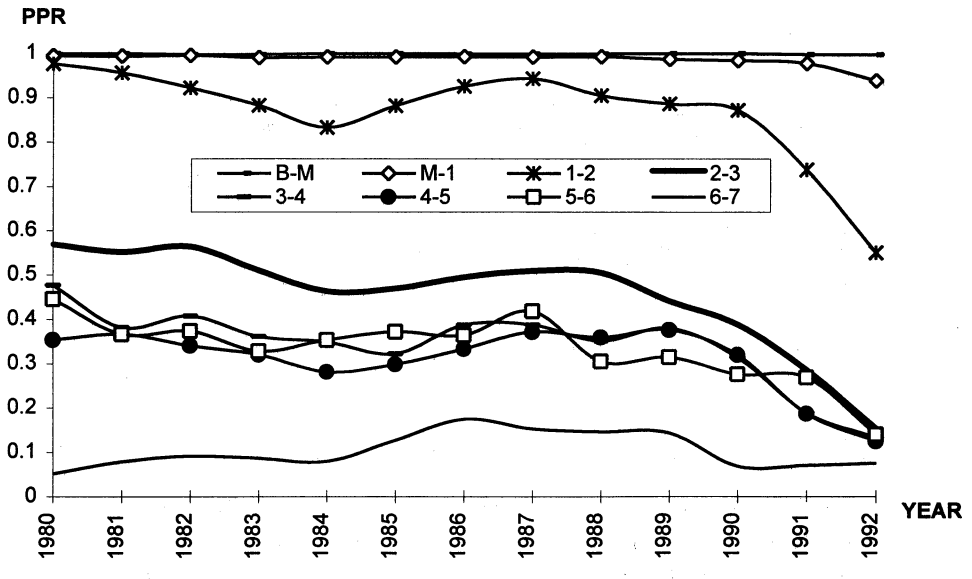

Figure 6. Period parity progression ratios for rural China,1980-92

Source: Same as figure 2

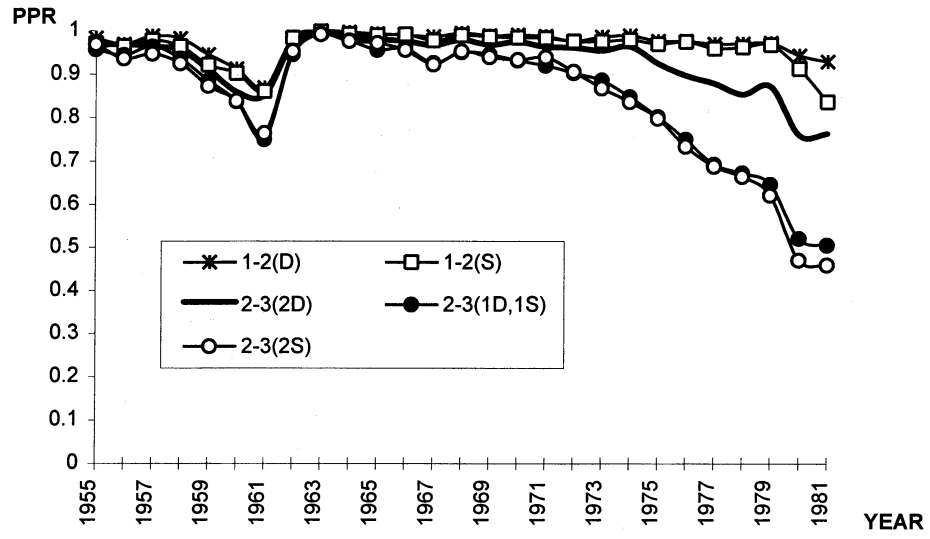

Figure 7. Period parity progression ratios from first to second and second to third births by sex composition of previous surviving children in the family, China, 1955-81
Source: Same as figure 1

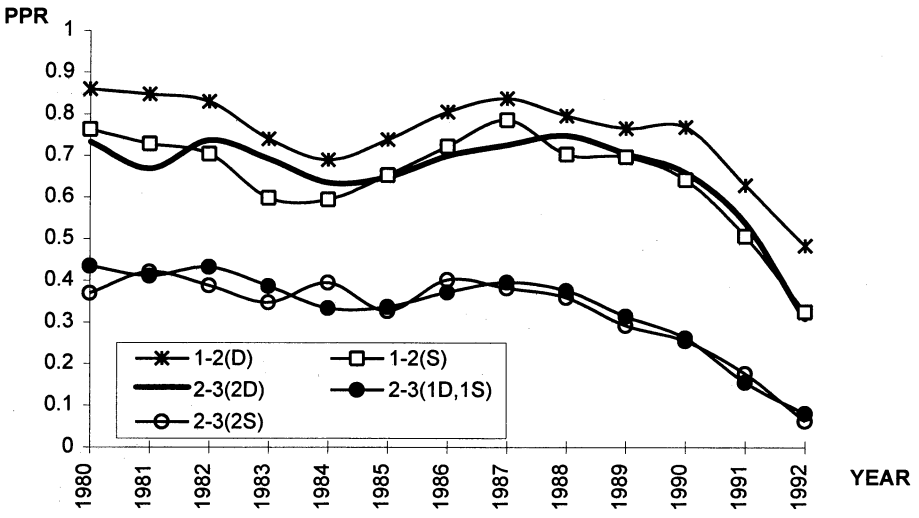

Figure 8. Period parity progression ratios from first to second and second to third births by sex composition of previous surviving children in the family, China, 1980-92
Source: Same as figure 2

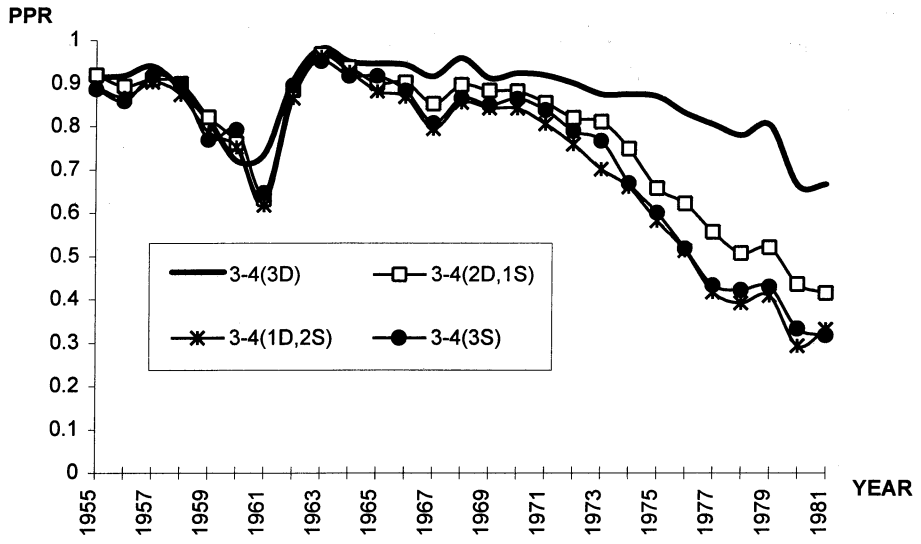

Figure 9. Period parity progression ratios from third to fourth birth by sex composition of previous surviving children in the family, China, 1955-81

Source: Same as figure 1

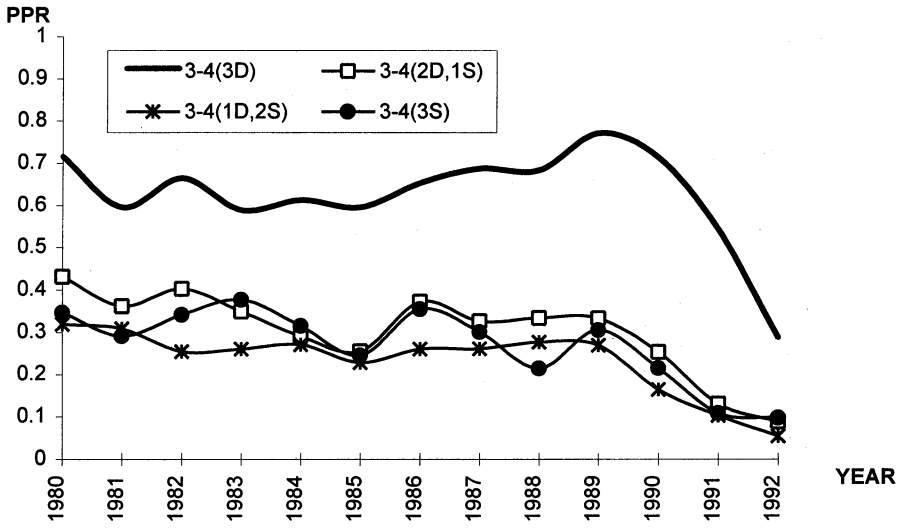

Figure10. Period parity progression ratios from third to fourth birth by sex composition of previous surviving children in the family, China, 1980-92

Source: Same as figure 2

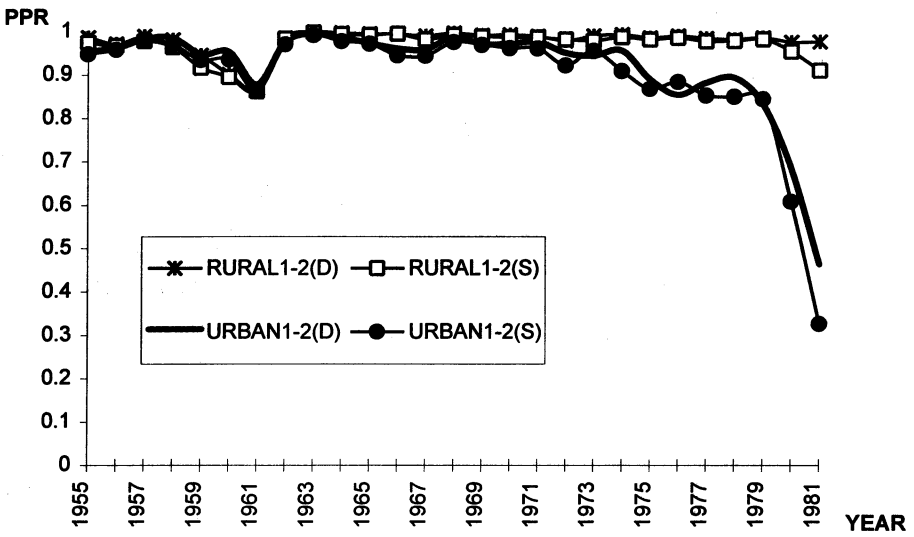

Figure 11. Period parity progression ratios from first to second birth by sex composition of previous surviving children in the family, China :urban and rural, 1955-81

Source: Same as figure 1

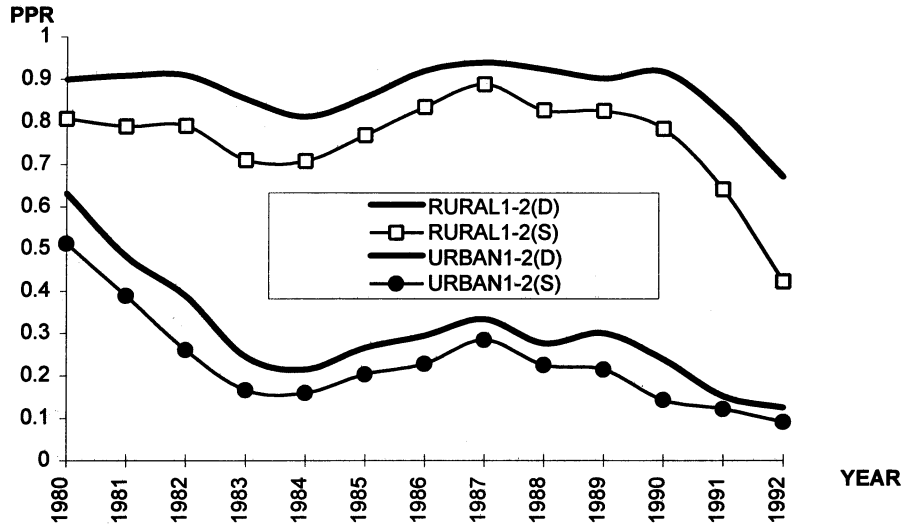

Figure12. Period parity progression ratios from first to second birth by sex composition of previous surviving children in the family, China: urban and rural, 1980-92

Source: Same as figure 2

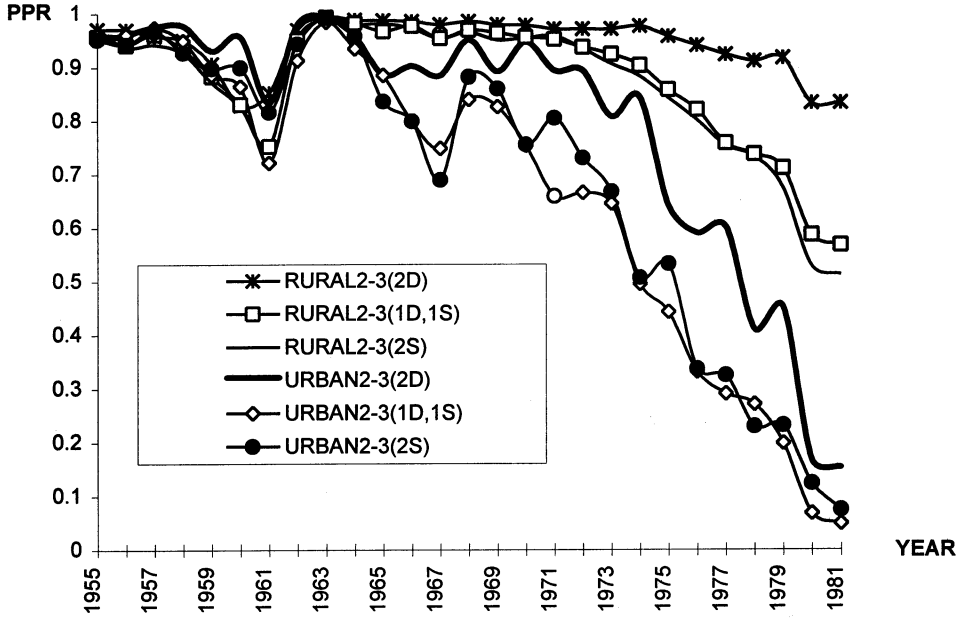

Figure 13.Period parity progression ratios from second to third birth by sex composition of previous surviving children in the family, China :urban and rural, 1955-81

Source: Same as figure 1

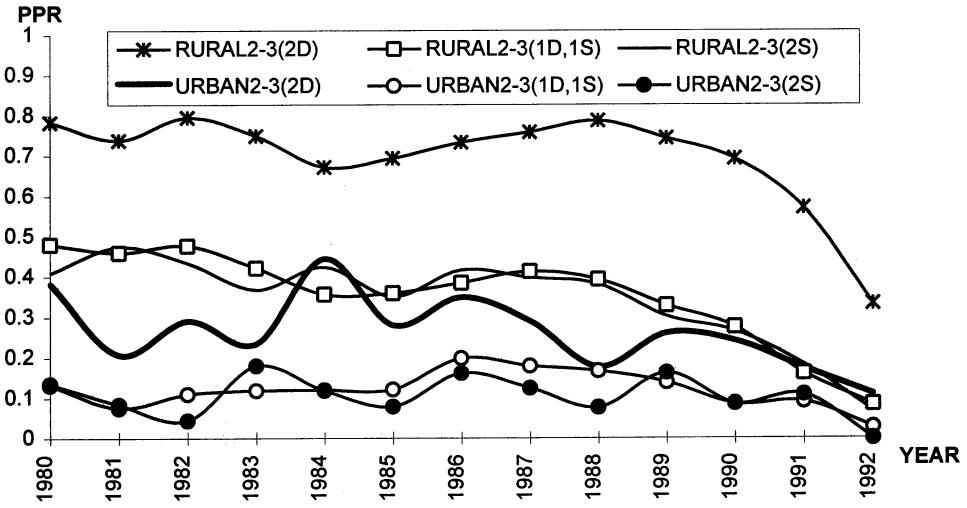

Figure 14. Period parity progression ratios from second to third birth by sex composition of previous surviving children in the family, China :urban and rural,1980-92

Source: Same as figure 2

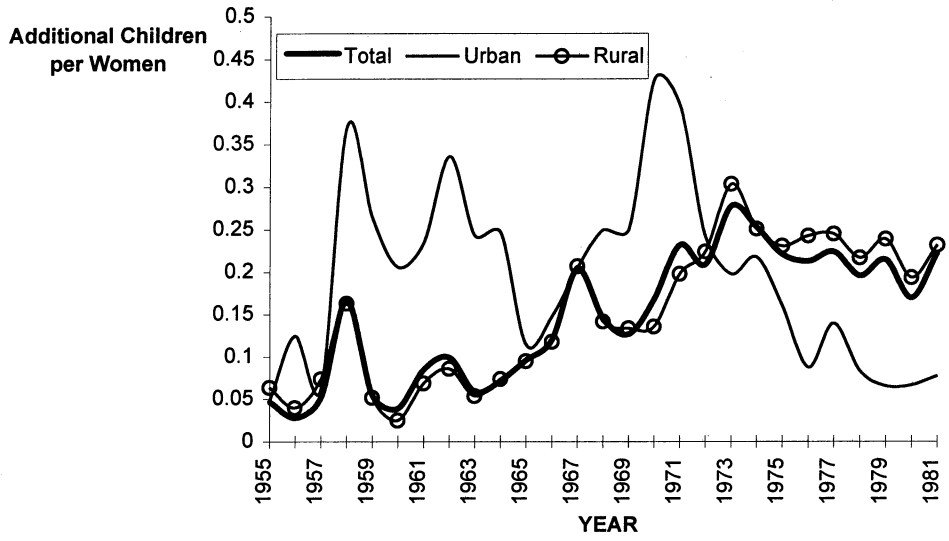

Figure 15. Increment in TFR caused by sex preference: China, urban and rural, 1955-81
Source: Same as figure 1

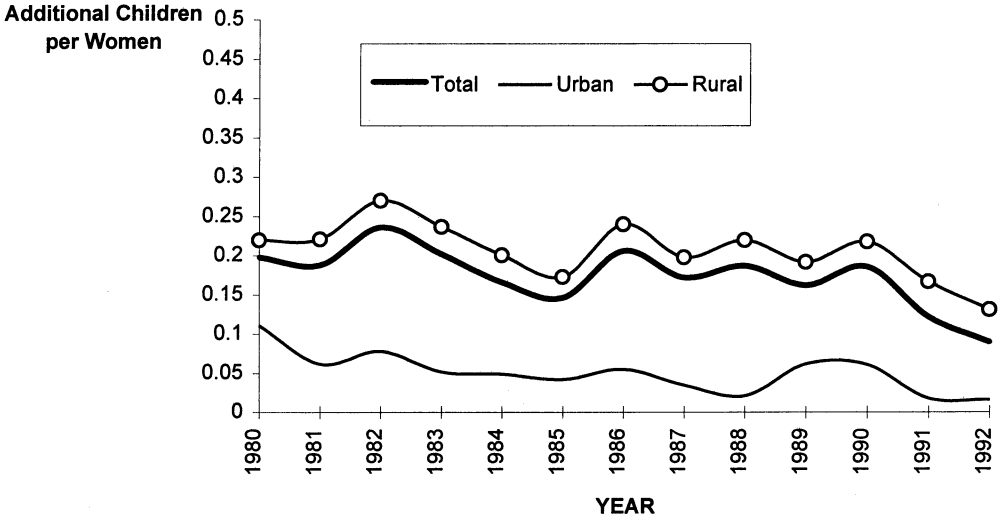

Figure16. Increment in TFR caused by sex preference: China, urban and rural, 1980-92
Source: Same as figure 2

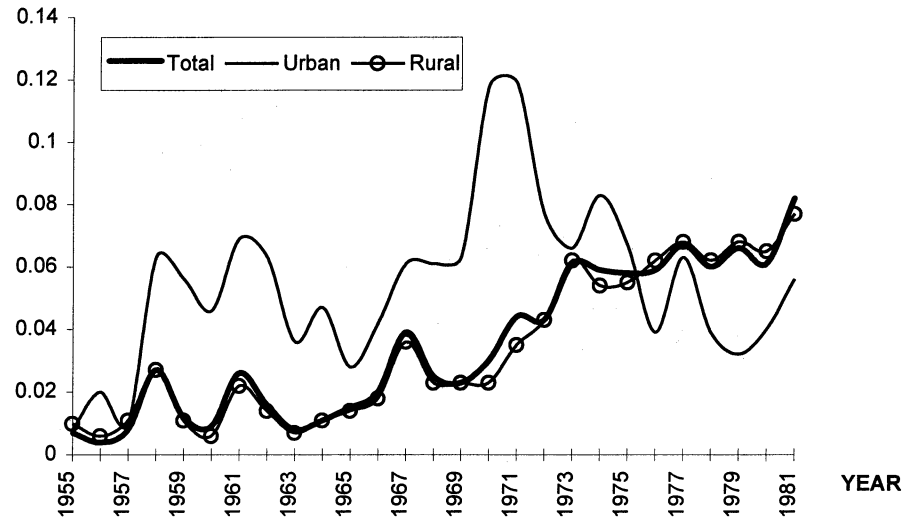

Figure 17. Proportion of TFR caused by sex preference: China, urban and rural, 1955-81
Source: Same as figure 1

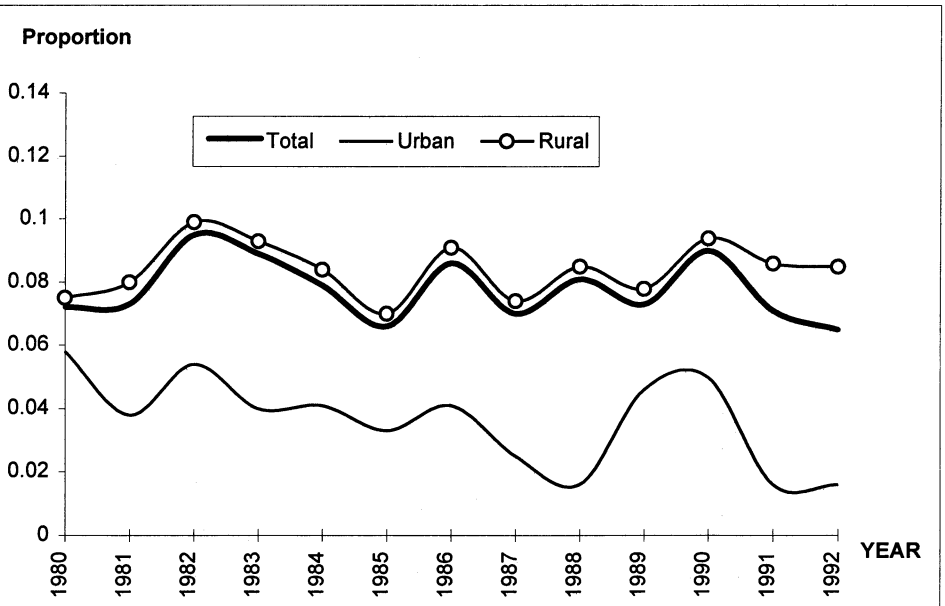

Figure18. Proportion of TFR caused by sex preference: China, urban and rural, 1980-92
Source: Same as figure 2

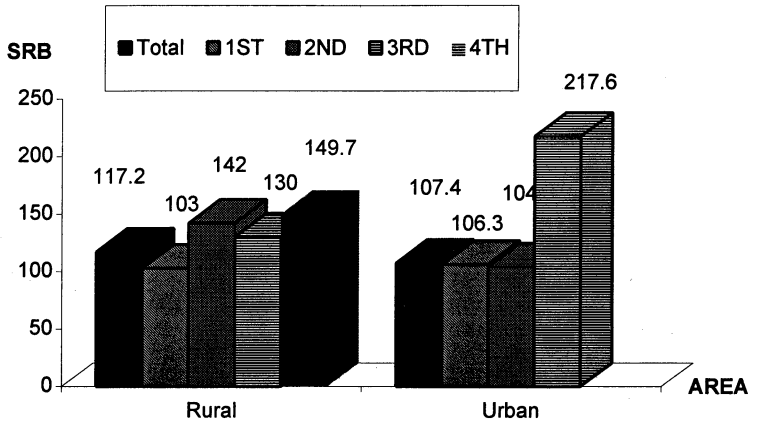

Figure 19. Sex ratio at birth by parity for China: urban and rural, 1992
Source: Sams as figure 2

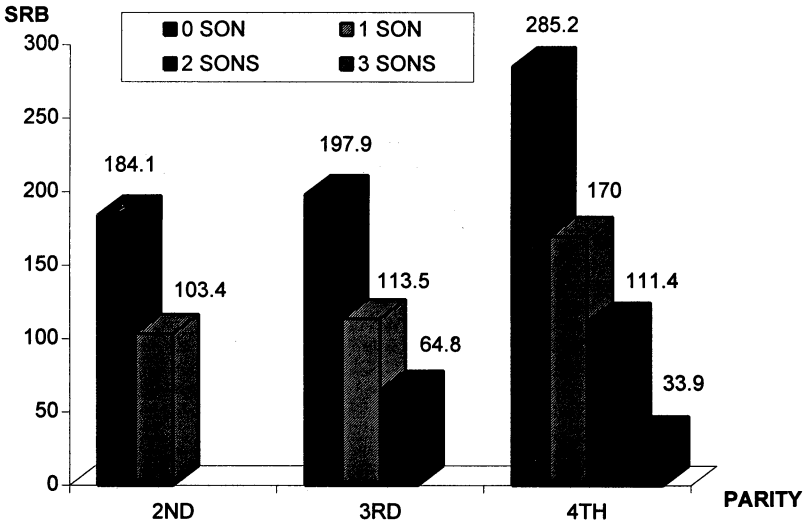

Figure 20. Sex ratio at birth by parity and the number of sons before current parity for China: rural, 1992
Source: Sams as figure 2

Chapter 7

Effects of Women's Educational Attainment on Fertility Change in China

Jie Zhan

Declines in Chinese fertility rates in recent years are of interest to both demographers and family planning policy-makers worldwide. Data from a 1992 survey conducted by the State Family Planning Commission provide an opportunity not only to analyze fertility trends, but also to examine the demographic and social consequences of changes in Chinese women's educational attainment. Before nationwide family planning efforts were introduced in China, the reproductive patterns of Chinese women were typical of other non-contracepting populations. In 1972, the average number of children for women of all ages who had completed their childbearing years was 4.5. Chinese family planning policies were first established in 1972-73. During the 1970s and 1980s Chinese women were exposed to centralized family planning campaigns designed to markedly reduce the country's fertility rates. As these initiatives began to affect families' decisions about childbearing, major social and cultural transformations were also taking place. Changing beliefs about the appropriate roles of young women within Chinese families and the labor force along with economic changes expanded educational opportunities for Chinese women. Social changes led to an increasing number of female students at the primary, secondary, and university levels.

This chapter examines the effect of educational attainment on the fertility of three cohorts of Chinese women as family planning policies changed through time. The analysis is based on data from a nationwide survey of 380,000 persons conducted by the State Family Planning Commission in 1992. Measures of educational attainment by Chinese women are useful in understanding the multiple factors that have led to fertility decline and that were part of the social and cultural transformations that took place in China from 1972 to 1992.[1]

The historical context of fertility decline in China and the speed with which it has taken place contrasts sharply to the slower fertility decline that occurred historically in Western Europe, North America, and most developing countries of the world. In western Europe and North America fertility rates declined largely due to changing economic and social conditions that were part of the industrial revolution. In western Europe, where the decline phase of the demographic transition began during the late eighteenth century in the absence of modern contraceptive technology, fertility decline has been a very gradual process. In western European countries and in North America, the drops in fertility rates came about predominately after substantial declines in mortality rates and the rate and patterns of decline varied from country to country.

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[1] Some evidence indicates that fertility was underestimated in the 1992 State Family Planning Commission survey because of data collection techniques (Yi 1996).

Population theorists continue to debate and reformulate hypotheses concerning the complex factors that resulted in historical demographic changes (Coale 1973; Caldwell 1975, 1980). Early writers who analyzed the demographic transition in Europe thought that social and economic changes brought about through the course of the industrial revolution played major roles in shaping the gradual process of fertility decline over several generations (Thompson 1929, Notestein 1945). Later theorists have focused on understanding the demographic transition as resulting from changes in the standard of living and changes in key social institutions (Teitelbaum 1975) that take place during economic development. Demographers continue to debate the usefulness of demographic transition theory in explaining fertility change in countries outside Europe and North America. In the developing nations of Asia and Latin America, the demographic transition has occurred in response to multiple factors, including economic development, greater educational opportunities, availability of modern methods of contraception, and social and health policies. The Chinese experience is clearly unique in that the fertility decline phase of the demographic transition has been influence to such a great extent by planned fertility control through centralized family planning initiatives.

From a historical perspective, extensive declines in Chinese birth rates have occurred within a markedly shorter period of time than those that occurred during the fertility decline phase of the demographic transition in Europe. Chinese fertility has changed over an even shorter period of time than fertility decline in Asia and in Latin America. Planned interventions initiated through Chinese family planning policies have clearly served as the major impetus for achieving lower rates of fertility. At the same time as economic and health policy changes took place throughout the country, there were accompanying social changes in both urban and rural sectors of the society. Expanding educational opportunities for Chinese women have led to an increasing proportion of females attending primary school, secondary school and university.

The three cohorts of women selected for analysis were in their childbearing years (ages 15-35) while major changes in family planning policy, access to education, and socioeconomic processes were taking place within China (Table 7- 1). In addition to being influenced by changes in national family planning policies, women of the same cohort were influenced by similar social and economic forces. To understand how the myriad changes affected the fertility of the three cohorts, we calculated the cumulative fertility for women in each of the three groups at 35 years of age. We selected age 35 because by then Chinese women's childbearing is largely completed.

Table 7-1. Three cohorts of Chinese women selected for analysis

Year	Cohort A	Cohort B	Cohort C
Birth	1947	1962	1982
Age 15	1952	1967	1987
Age 35	1957	1972	1992

Most of the childbearing years of women in cohort A occurred when there was no family planning policy. The reproductive period of women in cohort B, however, occurred when family planning policies began to have major impacts on women's fertility. Women in cohort B were 15 years of age by the year 1967 and reached 35 years by 1987. Between 1967 and 1987 the Chinese government embarked on national family planning policies to drastically reduce population growth rates. Between 1972 and 1979, policies encouraging couples to limit children to two. Women in cohort C, were 15 years of age by the year 1972 and had reached 35 of age by 1992. It was during the period 1972 and 1992 that the Chinese government sought to limit fertility.

In 1972, policy designed to limit births produced marked changes in young women's fertility patterns. The goals of the early campaigns are reflected in slogans and family planning expressions of the period. During 1972-1979 "wan, xi, shao" (later marriages, spaced births, and fewer births) was the goal. In some regions of the country a popular slogan was "One child is okay; two is ideal; three is too many." By 1980, when the policy of encouraging one child per couple was implemented, women in cohort C were 23 years old, the age considered ideal for marriage under Chinese family planning policy. While there were certainly regional and local differences in the ways that national policies were carried out, women of the same birth cohort were influenced by similar social forces and similar family planning programs as they married and later became pregnant.

We first considered the educational attainment of each of the three groups of women (Table 7-2). At every level, the proportion of the women in cohort C who received schooling was greater than that for the women in cohort B. Only about 30 percent of the women in cohort C

Table 7- 2. Educational attainment of three cohorts of Chinese women

Level of education	**Cohort A**	**Cohort B**	**Cohort C**
	(percent)	**(percent)**	**(percent)**
No formal education	39.6	34.7	30.2
Primary school	35.4	36.1	37.2
Junior high school	17.8	21.3	23.3
Senior high school	6.6	7.0	7.9
College	0.6	0.9	1.4
Total	100.0	100.0	100.0

Source: State Family Planning Commission of China, 1992 survey

received no formal education, compared with almost 40 percent of the women in cohort A and 35 percent of the women in cohort B. Women in cohort C attended college at more than twice the rate of women in cohort A and at a rate about 50 percent greater than that of cohort B.

In further analysis researchers examined the average number of births by age 35 (cumulative fertility) for the women in the three cohorts, by level of education (Table 7-3). Two trends were apparent. First, for each cohort there was an inverse relationship between educational attainment and cumulative fertility. More schooling was associated with lower cumulative fertility. Second, at every level of education, cumulative fertility declined from cohort to cohort; cohort B had a lower rate than cohort A, and cohort C had a lower rate than cohort B. The most dramatic change in fertility occurred among women with a college education. The cumulative fertility for college-educated women in cohort A (1.7 births) was almost twice that of their counterparts in cohort C (0.9 births).

Table 7- 3. Cumulative fertility through age 35 for three cohorts of Chinese women, by level of education

Level of education	Cohort A	Cohort B	Cohort C
No formal education	3.6	2.8	2.5
Primary school	3.3	2.6	2.2
Junior high school	2.8	1.9	1.8
Senior high school	2.0	1.6	1.5
College	1.7	1.1	0.9
Weighted mean	3.3	2.5	2.1

Source: State Family Planning Commission of China, 1992 survey

Increases in the numbers of years of schooling among Chinese women has had a strong influence on their age at marriage. As has been documented among other populations of women, educational attainment has created reductions in levels of fertility among Chinese women by delaying age at marriage and thereby shorting the period during which a woman bears children. The average age at marriage for the combined groups of Chinese women who had secondary school or college education was 23.5. Women with 7 years of education or more on average were about 4 years older when they married and had 2.2 fewer births than women with no formal education. Women with a college education were on average 1.2 years older when they married than were women with secondary school.

Findings from the survey also show that men's and women's education influence fertility patterns differently. Women with college education postpone marriage on average by 1.2 years beyond the age at marriage of their counterparts with secondary school educations. The average age of marriage for the combined group of Chinese women who have either completed secondary school training or college training is 23.5. The influence of men's educational level on family size was found to be less. With 7 years of formal schooling, men, on average, fathered 1.3 fewer children than their male counterparts with no educational training.

Historically, women with no formal education and primary education had higher fertility rates among Chinese women. On the whole, their numbers of births were higher than the national mean. By contrast women with secondary and college education had fertility rates below that of the national mean. Thus, at the individual level education appears to have been one of the social factors that has exerted some influence on total fertility rates beyond those more obviously shaped by national family planning guidelines.

There were notable urban-rural differences in the implementation of Chinese national family planning policies. At the national level from 1972 to 1979, the official family planning policy was for couples to have no more than two children. Beginning in the 1980's one child families were strongly promoted in cities. In rural areas, however, a somewhat more flexible policy was introduced. Among ethnic minorities and within more remote rural areas, there were differences in the ways policies were applied to local situations.

Cumulative fertility in China has declined faster in cities and towns in comparison to those in rural areas for several reasons. While children provide labor for agricultural families in rural areas, children are more costly to support in urban areas. Cities have offered better social and economic conditions and greater educational opportunities for women. In addition, some scholars have speculated that women in urban areas may have decided to limit their families because of the more crowded housing conditions that are typical of Chinese cities.

National Family Planning data document trends in urban and rural differences in the fertility for women of reproductive age. The cumulative fertility of women in cities and towns declined from 5.5 in 1952 to 2.9 in 1971 (State Family Planning Commission data). By contrast, the cumulative fertility of women in rural areas declined from 6.7 in 1952 to 6.0 in 1971. After 1971, following the implementation of family planning policies cumulative fertility for rural and urban women combined fell from 5.4 in 1971 to 2.1 in 1990. During 1971-1990, cumulative fertility declined from 2.9 to 1.4 in cities and towns and from 6.0 to 2.9 in rural areas (State Family Planning Commission data). Rural-urban migration from 1971 to 1990 brought high parity women into cities. Rural population movements into urban and town areas kept total fertility rates from further decline.

Table 7- 4 compares the cumulative fertility of urban and rural Chinese women in cohorts A, B, and C by educational level. For rural women with higher levels of education, fertility changed little between 1982 and 1992. For all three cohorts, at every educational level, women in rural areas had a higher fertility rate than their city-dwelling counterparts. Women in cohort A who lived in urban areas had an average cumulative fertility of 2.2, compared with that of their rural counterparts of 3.6. Similarly, urban women in cohort B had an average cumulative fertility of 1.6, compared with that of their rural counterparts of 2.7. Finally, the respective averages for urban and rural women in cohort C were 1.3 and 2.4.

Table 7-4. Cumulative Fertility Levels Among Urban and Rural Women Age 35

Cohort	Urban/ Rural	No formal schooling	Primary school	Junior high school	Senior high school	College	Weighted Mean
Cohort A	Urban	3.0	2.4	2.0	1.7	1.5	2.2
	Rural	3.9	3.2	2.9	2.6	1.8	3.6
	Total	3.7	3.0	2.7	2.4	1.7	3.3
Cohort B	Urban	2.2	2.0	1.6	1.3	1.1	1.6
	Rural	2.9	2.7	2.4	2.2	1.5	2.7
	Total	2.8	2.6	1.9	1.6	1.1	2.5
Cohort C	Urban	2.2	1.8	1.3	1.2	0.9	1.3
	Rural	2.5	2.3	2.2	2.1	1.5	2.4
	Total	2.5	2.2	1.8	1.5	0.9	2.1
Percentage change from cohort A to cohort B	Urban	-26.7	-16.7	-20.0	-23.5	-26.7	-27.3
	Rural	-25.6	-15.6	-17.2	-15.4	-16.7	-25.0
Percentage change from cohort B to cohort C	Urban	0.0	-10.0	-18.8	-7.7	-18.2	-18.8
	Rural	-13.8	-14.8	-8.3	-4.5	0.0	-11.1

Source: State Family Planning Commission of China, 1992 survey

An examination of fertility at age 35 for college educated rural women indicates a cumulative fertility of 1.8 in 1982, 1.5 in 1987, and 1.5 in 1992. Among urban women who had college education, the number of children was slightly lower with 1.5 on average in 1982, 1.1 in 1987, and 0.9 in 1992 (Table 7-4). The rural-urban differences for these college-educated women of the same educational level suggest that the average number of births per woman was the result of multiple social and cultural factors, not education alone. Further research is needed that examines the diverse responses of women to family planning policies and personal circumstances. The higher percentage of more highly educated women who live in urban areas may be one of the factors contributing to the faster pace of fertility decline in urban Chinese regions as compared to rural areas.

Some differences in the fertility levels between urban and rural women can be observed in the 3 different cohorts. While both urban and rural women experienced fertility declines between 1982 and 1992 at all educational levels, the pace of fertility decline between 1987 and 1992 for rural women, has leveled off. The relative weight of the multiple factors that shaped fertility, however,

is highly speculative, since at present there is no empirical data available that document women's actual decision-making pattern.

Provincial differences in fertility and educational patterns reflect the vast social and cultural diversities of the Chinese population. In addition to the social and cultural differences, the degree of socioeconomic development varies from region to region. During the past two decades, family planning policies have been implemented in somewhat different ways within the different provinces. Women's educational attainment varies less among provinces than do levels of fertility. There is considerable variation from one province to another in the relationship between educational level and fertility. Women in the provinces of Liaoning, Jilin, Heilongjiang, and Jiangsu, for example, rank high in educational attainment and have relatively low levels of fertility. In Jiangsu, the province with the second lowest fertility of 1.5 births per woman, the average number of years of schooling was 5.8, and the rate of illiteracy was 22.3 per 100. There are provinces, however, for which both the educational level and fertility level are relatively high. For example, in Guangdong women of childbearing age also averaged 5.8 years of schooling, but the fertility level of 2.4 births per woman ranked the province at only 17th lowest in the country. When all provinces were considered, there was a slight negative correlation between average years of schooling and fertility level, but the relationship was not remarkable.

In rural areas, the role of educational attainment appears greater than that in cities and towns. While there are no knowledge, attitude and practice data available for the Chinese women comprising this survey, education may have provided the bases for behavioral and reproductive change. The complex set of factors that make education a critical factor in shaping women's fertility have been documented for some areas of the world. Highly educated women may have evaluated reproductive decision-making differently. More highly educated women may have perceived the health benefits of limiting and spacing births more readily than rural counterparts. There are many other factors that may have contributed to this pattern, however. The survey does not provide sufficient data on the range of factors influencing fertility choice that are needed for a thorough analysis.

Education has been one of the intervening variables that has affected fertility decline in China. Clearly the role of national level policies in reducing family size has been strong. Women's new educational opportunities, however, have played a role in shaping provincial and the rural-urban differences in the rate of fertility decline. An examination of historical trends among successive birth cohorts of women indicates that women with no education and those with primary education had more children than women with secondary and higher education. Women with secondary schooling and some college education had fertility levels below that of the nationwide mean. Delays in age at marriage is, in part, a response to women's increasing educational opportunities. Women with college education postponed marriage on average by 1.2 years beyond the age at marriage of their counterparts with secondary school training. For women having 7 years of education or more, marriage was postponed 4 years later than that of women who had no formal education. These combined rural and urban women with 7 years of education or more had 2.2 fewer births on average.

Table 7-5. Educational attainment and fertility of Chinese women by province

Locale or province	Average years of schooling	Rank	Standardized Illiteracy Rate per 100	Rank	Cumulative fertility through age 35	Rank
Metropolitan Areas*	7.5	1	11.5	1	1.2	1
Liaoning	6.7	2	12.7	2	1.5	2
Jilin	6.4	3	16.2	3	1.9	5
Heilongjiang	6.3	4	18.1	6	1.9	5
Shanxi	6.0	5	17.1	4	2.3	15
Guangdong	5.8	6	17.3	5	2.4	17
Jiangsu	5.8	6	22.3	12	1.5	2
Neimang	5.7	8	22.8	14	2.0	7
Hunan	5.7	8	23.3	16	2.3	13
Xinjiang	5.6	10	20.3	9	3.1	25
Hubei	5.6	10	23.4	17	2.1	9
Henan	5.5	12	18.2	7	2.4	17
Zhejiang	5.5	12	22.7	13	1.8	4
Hebei	5.5	12	22.0	11	2.3	13
Shandong	5.4	15	23.2	15	2.1	9
Guangxi	5.4	15	19.0	8	2.8	22
Sichuan	5.4	15	21.7	10	2.0	7
Fujian	5.2	18	25.4	18	2.5	19
Jiangsi	5.2	18	27.7	20	2.6	20
Shaangxi	5.1	20	27.2	19	2.2	11
Anhui	4.6	21	34.6	21	2.2	23
Guizhou	4.2	22	41.0	24	2.9	13
Gansu	4.3	23	40.3	23	2.3	14
Yunnan	4.1	24	37.4	22	2.6	20
Hainan, Ningxia, Qinghai, and Tibet combined	4.1	24	42.1	25	2.9	23

* Beijing, Tianjin, Shanghai Source: Data on schooling and fertility from State Family Planning Commission of China 1992 Survey; illiteracy rates from Liu and Chen 1992, p. 749.

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Chapter 8

Impact of Declining Fertility on Population Growth and Socioeconomic Development

Zhang Lingguang

According to the 1992 sample survey of 380,000 women of childbearing age, the total fertility rate (TFR) in 1986 was 2.45 and 2.57 by the fertility history and reverse survival methods, respectively. Fertility has declined steadily since 1986. Based on fertility history data, the TFR was 1.72 in 1992. Thus, in only six years, the fertility rate dropped by more than one-third.

During 1986–1992, the age structure of the population was conducive to a high birth rate: women of childbearing age accounted for 28 percent of the total population. Most of the decline in the birth rate was due to a decline in age-specific fertility (see chapter 3). The age structure of women raised the birth rate by 2.1 points per 1000 during this period, while the change in the proportion of fertile women caused an increase of 0.6 points per 1000. (Increased age at first marriage also had some effect on the birth rate.) Thus, the decline in fertility reduced the birth rate by 8.4 points per 1000.

Beginning in about 1962, there was a rapid increase in China's population, with the rate of increase staying at a plateau for ten years due to a baby boom. Most women born in that period entered into marriage and childbearing age in the mid-1980s. The dramatic decline of births in the years since the early 1970s resulted in a reduction of population of each group born during this period to only two-thirds of the population born during the baby boom. Those born after the 1970s will generally enter into marriage and childbearing age in the second half of the 1990s. As expected, the task of controlling population growth in the years before 1995 was very difficult. The population situation in China was quite encouraging owing to the concerted efforts made by the government and the public and also due to an adequate supply of contraceptives. Though 1993 and 1994 are the two years with the highest proportion of women of childbearing age, there were only 20 million births annually owing to the low fertility during in this period.

The important question is: Can the low fertility rates of the late 1980s and early 1990s be maintained? A comparison of the cumulative total fertility rate of women in 1987 and that in 1992 provides reason for optimism. In 1987, the cumulative fertility rate of women aged 30 years averaged at 2.08. In 1992, five years later, the average for women aged 35 years had increased by only 0.02 birth per women, to 2.10. A comparison of the average cumulative fertility of women aged 30 to 39 in 1987 and the average for women aged 35 to 40 in 1992 provides a similar result. These comparisons suggest strongly that the mean cumulative fertility for women aged 30 years is almost identical to the mean life-time fertility level. Moreover, since women in their twenties have been exposed to the family planning program since they were in primary school and have better access to education, their fertility can be expected to be lower than that for women in their thirties.

Statistical analysis shows that total fertility rates are closely correlated to the mean age at first-parity, second-parity and third-parity births. The following regression equation is designed to be used to calculate the total fertility rates:

$$TFR = 16.03 - 2.3137ma_1 + 0.7103ma_2 + 0.8518ma_3$$

Where ma_1, ma_2, ma_3 are respectively women's mean age at first, second, and third births. It is noteworthy that the regression coefficients for the mean ages at second-parity and third-parity births are opposite to the sign of the regression coefficients for the mean age at first-parity births. This does not mean that the lower the ages of mothers at second-parity and third-parity births are, the lower the fertility rate will be, but that the considerable decrease in second-parity and third-parity births is a regular process for the reduction of the fertility rate. Women at older ages are likely to decide to stop childbearing and therefore, most women have already had their second-parity and third-parity births. Therefore, we have to focus family planning efforts on younger women, which is the key to maintaining the low fertility level.

To maintain the low fertility rate, it also will be necessary to continue the process of urbanization and socioeconomic development. The close relationship between the total fertility rate and development can be shown by a regression equation. If the overall rate of contraceptive use is x_1, the infant mortality rate is x_2, the illiteracy rate of women is x_3, the proportion of the population that is urban is x_4, the per capita consumption level of the rural population is x_5, and the total fertility rate is TFR, we can construct the following equation:

$$\ln (TFR) = (0.5426 - 0.0699x_1 + 0.0659x_2 + 0.0567x_3 - 0.0745\ln x_4 + 0.0509) / x_5$$

In this equation, $R^2 = 0.723$ and $F = 10.950$. The independent variables in the equation have been stable in recent years.

This equation is useful for examining the TFR for the nation as a whole, but it does not explain regional differences in the fertility rate. These differences are probably best explained by the differential effectiveness of the family planning program in different regions.

Rank correlation coefficients were calculated to study the relationship between economic development and fertility decline. The coefficients for 1986 and 1992 were 0.526 and 0.442, respectively. For the nonagriculture population, the respective coefficients were 0.312 and 0.236, while for farmers, they were 0.506 and 0.294. It appears that higher incomes had some influence on the decline in fertility. The effect was stronger for urban residents than for rural residents. The rank correlation coefficient in 1992 was lower than that of 1986. This reflects the fact that many more economically developed provinces achieved low fertility in the 1970s and 1980s, leaving little room for further reductions.

Population Growth and the Availability of Resources

Based on recent trends in fertility, two long-range population projections have been developed. The first projection assumes that the total fertility rate will be 1.8 by 2010 and then rise to 2.1 by 2020. Consequently, the population would be under 1.28 billion by 2000 and would then grow. The population then would increase by one million people per year in the later period until the year 2155.

The second projection assumes that the total fertility rate will drop to 1.8 by 2000, which is the same as the first scheme, and remain at that level. In this case, the population would reach a peak of about 1.52 billion by 2041 and then fall to 900 million in the year 2155.

The availability of resources—fresh water, land, and fuel—must be taken into account in deciding on an optimal population size. Of these, fresh water, which is indispensable to industrial and agricultural production, is the most important. China's quantity of fresh water is far from adequate for its population. The country requires an estimated 600 billion cubic meters of fresh water annually, which exceeds the water supply by 100 billion cubic meters.

Today, 108 cities are in serious need of fresh water. Moreover, the ground water level has fallen considerably in many areas because of extraction. The unbalanced distribution of fresh water and land resources is also a serious concern. For example, the water resources south of the Yangzi River accounts for 83 percent of the national total, yet the region has 38 percent of the cultivated land. By contrast, 42 percent of the country's cultivated land and only 9 percent of total water resources are in the drainage of the Yellow, Huai, Haihe, and Liaohe Rivers. Thus, the shortage of fresh water is even more worrisome when viewed at a subnational level.

Another problem related to water resources is the timing of the supply of water. During the rainy season, water runs directly into the sea and floods often occur. During dry seasons, some rivers, such as the Yellow River, stop flowing. The construction of reservoirs to divert water from south China to north China would require a vast sum of money.

The adoption of water-saving techniques can help alleviate the country's water shortage. Based on the estimate of China's resources, however, China is thought to be able to accommodate a maximum population of about 1.6 billion.

Cultivated land is another indispensable and nonrenewable resource that imposes a limit on the population that can be supported. Today, China has too many people relative to the cultivated land area. As a result, continued population growth will further strain China's ability to support its population. China also has a shortage of energy. The annual per capita consumption of energy is 0.7 ton of standard coal. By comparison, U.S. consumption is 9.4 tons, and that of Japan is 3.5 tons. With continued economic development, the country's annual need for energy will exceed 60 million tons of standard coal, 20 million tons more than the annual supply. From the standpoint of both energy needs and cultivated land, it has been estimated that China's population should not exceed 1.6 billion.

As stated above, in choosing between the two population projections, the long-range target is an important consideration for policy decisions. We can draw two conclusions for controlling population growth. The first is that it is not necessary to make the family planning policy tighter as long as the willingness of the public to practice family planning continues to increase. The second regards whether a second birth should be permitted for all couples, as some have suggested. This view is quite popular among some researchers, but it could harm the family planning program instead of benefiting it, since many people who practice family planning voluntarily and those who want to have more children are likely to be unhappy about it. Should all couples have two children would increase the number of births by about 700 million over the course of the projections, and therefore is unacceptable. Maintenance of a low fertility level is essential to continued socioeconomic development.

Impact on the Pension System

China's declining fertility rate is shifting the age structure of the population, creating a larger proportion of elderly people. It is important for researchers to investigate the economic and social impact of increased number of elderly people and declining fertility and to try to determine the best strategies for dealing with these changes. The percentage of the population that is over age 60 years will peak at about 30 percent in the middle of the next century. By way of comparison, 8.0 percent of the nonagricultural population and 8.4 percent of the agricultural population was aged 60 and above in 1992.

The key question is the country's ability to support its retired population in the future when the economic burden imposed by today's retired population is already considerable. From 1978 to 1989, the total number of employed people increased by 46 percent, but the expenditure on wages rose 360 percent. During this period, the number of retirees increased sixfold, while the expenditure on pensions rose by 17 times. At the same time, the per capita increase in pension payments decreased from 90 percent to 76 percent. This has resulted in retirees feeling a relative reduction in their income as well as society experiencing a heavy burden. Pension expenditures are expected to account for 20 percent of the total expenditure on wages by 2010 and to exceed 30 percent by 2050.

To solve the problem of social security for the elderly, it is necessary to analyze the pension systems. There are the cash income and expense system, complete funding system and partial funding system. The cash income and expense system is the one in effect currently, by which the required pension should be levied in the same year. This system is simple, but full of problems. The present working population should be responsible for paying the pension for retirees and it will result in a negative impact on the initiative of the current laborers. The complete funding system is one by which laborers support themselves through compulsory savings, which are used to set up a personal retirement fund.

The result of calculation of models indicates that if the compound interest rate of the fund is set at 5 percent and has gradually increased linearly since 1991, it will reach 20 percent of the gross value of wages by the year of 2006. This proportion of the old age fund will be shared among the State, enterprises and staff and workers. Therefore, the rate of fund collection may be kept at

about 20 percent. During the period from 2030 to 2060, there will be a deficit of three trillion yuan, but there will be 3.5 trillion yuan of surplus fund plus interest in the years before 2030, which can be used to pay for the deficit.

Impact on the Workforce and Labor Productivity

One final concern that we have examined relates to the labor force. There are now 100 million to 150 million surplus rural laborers throughout China, and between 20 and 30 percent of the workers in state-owned enterprises are redundant. This labor surplus increases production costs and has a negative impact on the introduction of modern technology.

Economic development in China is hampered by this longstanding labor surplus. Between 1982 and 1990, the working-age population increased at an annual rate of growth of 2.6 percent, while the national population grew by only 1.5 percent. The number of surplus workers in the agricultural sector alone is estimated at 100 million, and some estimate that the surplus may double by 2000.

Although the impact of a declining birth rate on the size of the national labor force will not be fully demonstrated for more than a decade, areas where the family planning program has been strictly enforced are beginning to see the benefits. Beijing, Shanghai, Tianjin, Zhejiang, Jiangsu, and Sichuan all have the most abundant labor forces and the smallest dependency ratios among the country's provinces and municipalities. As a result, these areas are seeing their production capacity improved; fewer new, inexperienced workers are entering the workforce; pressure on employment is alleviated; job opportunities are being created in both capital-intensive and labor-intensive industries; and the standard of living is rising.

With strict, nationwide enforcement of the family planning program, labor supply and demand could achieve balance by 2020. As a result of this balance, both the qualifications of workers and labor productivity will rise, as will economic development.

Areas and cities with a low birth rate can be expected to benefit from three trends resulting from decreased fertility. First, the growing proportion of the working population improves the capacity for production in these areas. Second, the reduction in the proportion of children results in a decrease in newly added employed persons, alleviates pressure on employment, and creates job opportunities in both capital-intensive and labor-intensive industries. Third, the reduction in the total dependency ratio leads to improvements in people's living standards.

Poverty and Effect on Income Distribution

One of the goals of China's socialist economy is to eliminate poverty. Reducing the birth rate will significantly help in attaining this goal. Since 1985, when the State Council implemented the Program for Alleviating Poverty in Key Areas, the number of people below the poverty line has decreased by 75 percent, to 80 million people (after readjustment of the poverty criteria). In many regions, birth control and out-migration are the two main means for alleviating poverty, making the family planning program an indispensable tool.

The relationship between population growth and income distribution is more complicated than that between population growth and poverty alleviation. Moreover, income distribution is related to many factors, the birth rate being only one. Using the equality ratio as a measure (the ratio of the 20 percent of families with the highest income to the 20 percent with the lowest income), China's income distribution in the 1980s was the most equally distributed in the world. Neither an extremely equal nor an extremely unequal income distribution is favorable for rapid economic development. Extremely equal income distribution is likely to bring about an "eating in the same rice pot" phenomenon, which greatly reduces labor productivity. Extremely unequal income distribution may likewise result in unreasonable resource distribution. Extravagant consumption by a small proportion of people will also lead to a reduction of productivity.

Theoretically, overly rapid growth of the labor force will bring about low productivity, particularly in the case of China, which has already a large surplus labor force. A reduction in the birth rate will result in a smaller labor force with higher incomes, as occurred in Japan. In China, Shanghai was the first among provinces, autonomous regions, and municipalities to attain negative population growth. As a result, Shanghai depends on an inflow of migrant labor. To protect the incomes of local workers, migrant workers are issued a green card and are not eligible for permanent residence. The situation is similar in Guangdong Province. An analysis of data from other countries and the present situation in China leads to the conclusion that if the equality ratio for income distribution were set between 5 and 6 for a period of time, both economic efficiency and prosperity among the country's people could be attained.

Conclusion

The relationship between population and socioeconomic development is a complicated one. Conclusions and strategies are different owing to different conditions in various countries. One should start from the present situation to carry out research on the impact of the declining birth rate on sustainable development. We draw the following conclusions, based on China's current situation and the likely impact of population growth on socioeconomic development.

China's family planning program has been very successful in reducing the birth rate, although regional differences in fertility will remain for a long time. Efforts to control population growth must not slacken. The total fertility rate must be maintained at a level slightly lower than the replacement level for a fairly long period of time. One of the most compelling reasons is that China's limited resources, such as water and land, must be taken into account when examining sustainable development and the maximum population that can be supported. Natural resources permit China to have a maximum population of 1.6 billion.

Support for the elderly will be a vital issue for society in the years to come. Changes in the social security system are suggested. We propose adopting the partial funding system for supporting the elderly.

The decline in the birth rate will help China reduce its surplus labor force, which will have positive effects on income distribution, labor productivity, and economic development and technological innovation. These benefits are being seen in areas where the family planning program

has been in effect the longest time. Controlling population growth is key to increased income and poverty alleviation. More unequal distribution of income may contribute to improved labor productivity and facilitate economic development. A lower birth rate is no doubt favorable to realizing this pattern of income distribution.

In conclusion, it will be beneficial for China to maintain a low birth rate over a fairly long period of time for socioeconomic development, improving people's living standard, improving the quality of human resources, reasonable utilization of resources and the protection of the environment. Therefore, adherence to the family planning program goals as a basic national policy should be maintained.

Chapter 9

Using the Birth Number Base and Mean Birth Number Base to Estimate Total Fertility in China, 1990–2010

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Birth number base is an important concept in analyzing fertility and projecting population (Han and Lin, 1989). The birth number base (BNB) is the number of births (B) when the total fertility rate (TFR) equals one. Knowing BNB makes it possible to calculate TFR and B. This method is more direct than other methods for estimating TFR.

In this chapter, we introduce the concept of mean birth number base (MBNB) and analyze the effect of birth model (i.e., the structure of age-specific fertility) female age-specific mortality, and female age structure on both BNB and MBNB. Knowing MBNB, we can calculate TFR using only the birthrate (BR). This is an even simpler way to estimate TFR than using BNB. We can also use MBNB to calculate gross fertility (GF), another index that describes the level of fertility. We also discuss some applications of BNB and MBNB and estimate the BNB and the MBNB in China for the years 1990–2010.

The Effect of Various Factors on BNB and MBNB

We know that the relation between BNB and other variables is

$$BNB(t) = \sum_{i=r_1}^{r_2} h_i(t) W_i(t), \tag{9.1}$$

where $[r_1, r_2]$ is the childbearing age interval (generally $r_1 = 15$, $r_2 = 49$), $h_i(t)$, $I \in [15, 49]$ is the standard birth model that satisfies $\sum_{i=15}^{49} h_i(t) = 1$, and $W_i(t)$, $i \in [15, 49]$ is the number of women at age I (the effect of migration is ignored). BNB(t) is the number of births required for TFR to equal 1. MBNB is the ratio of BNB to (1) the number of women of childbearing age or (2) total population. The first, denoted by MBNB1, is the mean BNB of women of childbearing age; the second, denoted by MBNB2, is the mean BNB of total population. They are calculated as follows:

$$MBNB1(t) = \frac{BNB(t)}{W(t)} = \sum_{i=15}^{49} h_i(t) \times \frac{W_i(t)}{W(t)} \tag{9.2}$$

$$MBNB2(t) = \frac{BNB(t)}{N(t)} = \sum_{i=15}^{49} h_i(t) \times \frac{W_i(t)}{N(t)} = \frac{W(t)}{N(t)} \times \sum_{i=15}^{49} h_i(t) \times \frac{W_i(t)}{W(t)} \tag{9.3}$$

where $W(t) = \sum_{i=15}^{49} W_i(t)$ is the total number of women of childbearing age and $N(t)$ is total population. The relation between MBNB1 and MBNB2 is

$$MBNB2(t) = \frac{W(t)}{N(t)} \times MBNB1(t). \tag{9.4}$$

From (9.1) we know that BNB relies mainly on the birth model and the age structure of women of childbearing age, which, in turn, is determined by the initial female age structure and female age-specific mortality. Thus, once the initial female age structure is chosen, the forecasting of BNB is a function of the projected levels of female age-specific mortality and the birth model. After comparing the results from various data sources, we draw the following conclusions about BNB:

- For different levels of female age-specific mortality, the maximum error of BNB was 73,000 in 1990 and is not over 40,000 during 1991–2005; furthermore, its maximum relative error is less than 4 percent. The effect of female age-specific mortality on BNB is negligible, so that when forecasting BNB, we can choose a level of female age-specific mortality for a relatively stable period.

- In studying seven birth models, we found the maximum absolute error of BNB to be about 30,000 with a relative error of only 3 percent. Thus, the forecasting of BNB is sensitive to the birth model. To estimate BNB accurately, therefore, the birth model should be selected by a method that takes into account this sensitivity.

MBNB1 and MBNB2 are affected by the birth model, the ratio of the number of women of childbearing age to the total number of women (W_i/W) and the ratio of the number of women of childbearing age to the total population (W/N). However, the direct effects are principally from the birth model, female age-specific mortality, and gross mortality.

We draw the following conclusions about MBNB:

- The effect of the birth model on MBNB is comparatively large, especially for MBNB2, because for different birth models the maximum relative error of MBNB1 is about 2.1 percent and that of MBNB2 is about 3.2 percent.

- The effect of female age-specific mortality on MBNB is insignificant because the relative errors of MBNB1 and MBNB2 do not exceed 3 percent and 2 percent, respectively.

- We know from (9.2) and (9.3) that the effect of gross mortality on MBNB2 depends on the estimate of total population. We assume that TFR(t), female age-specific mortality $\mu_i(t)$, and the birth model $h_i(t)(I \in [15, 49])$ remain fixed. Gross mortality during 1981–1992 varies

from 6.4% to 6.9%, changing relatively slowly. Theoretically, $MBNB2(t_0 + k)$ is proportional to the kth power of $MBNB2(t_0)$. But because the value of $MBNB2(t_0)$ is very small, the effect of gross mortality on MBNB2 is also small. After calculating MBNB2 using various gross mortality levels, we found that the maximum relative error is just over 3 percent, as the theoretical analysis indicated.

Calculation of BNB and MBNB for 1990–2010

As discussed above, the effect of initial female age structure on BNB is greater than that of the birth model; and the effect of female age-specific mortality, the smallest of the three factors, can be disregarded. In forecasting BNB, we therefore adopt the initial female age structure from census data to the extent possible. We use female age-specific mortality for the initial year, and we generate the birth model from initial data. We chose 1990 census data to compute BNB for 1990–2010 and set the female age-specific mortality for the period equal to that for 1990. We obtained the birth model for 1990–2010 by the tracking method (see Yao and Han, 1994).

Similarly, the birth model is an important factor affecting MBNB once the initial female age structure is chosen. Female mortality can be disregarded, since its effect on MBNB is negligible. As we did for BNB, we adopted the female age-specific mortality for 1990 as the initial female mortality in forecasting MBNB.

The total population is estimated by

$$N(t_0 + k) \doteq N(t_0) \times (1 - \mu^*)^k + BNB(t_0 + k) \times TFR, \tag{9.5}$$

where μ^* is gross mortality and we use the following values: TFR(1990) = 2.13, TFR(1991) = 1.96, TFR(1992) = 1.81, and TFR(t) = 2.00, t = 1993, ···2010, and μ^* = 6.6% (the mean level from 1987 to 1992). Table 9.1 shows the results of our calculations.

Figure 9.1. Birth number base, 1990–2010

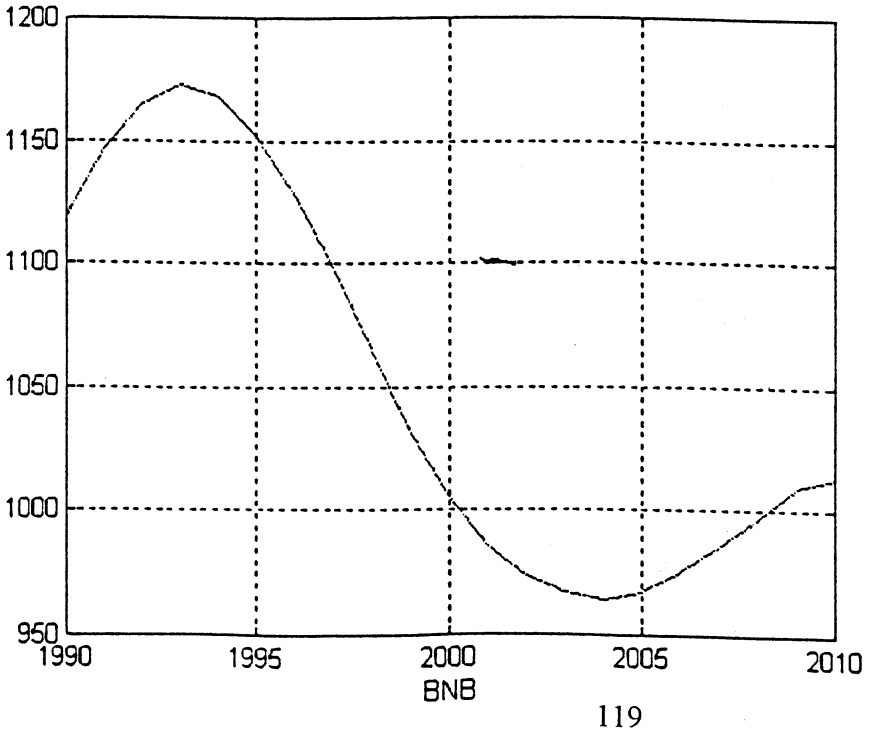


Table 9.1. BNB, MBNB, and other indexes, 1990–2010

Year	W (10,000)	BNB (10,000)	WR (%)	MBNB(1) (%)	MBNB(2) (%)	RMBNB (%)
1990	3088.3	1119.3	26.818	36.242	9.7192	3.7289
1991	3134.9	1146.7	26.855	36.577	9.8229	3.7273
1992	3177.7	1165.1	26.898	36.664	9.8619	3.7178
1993	3219.8	1172.7	26.926	36.421	9.8068	3.7139
1994	3259.9	1168.1	26.916	35.831	9.6444	3.7153
1995	3294.0	1151.9	26.867	34.969	9.3952	3.7220
1996	3331.3	1127.8	26.857	33.854	9.0924	3.7234
1997	3370.4	1098.3	26.876	32.586	8.7579	3.7207
1998	3399.7	1065.3	26.833	31.336	8.4086	3.7267
1999	3421.5	1032.8	26.749	30.185	8.0743	3.7384
2000	3445.0	1005.3	26.692	29.181	7.7890	3.7465
2001	3474.2	985.69	26.689	28.372	7.5722	3.7468
2002	3503.0	974.00	26.690	27.805	7.4211	3.7467
2003	3525.3	967.16	26.646	27.435	7.3102	3.7529
2004	3538.3	964.25	26.535	27.252	7.2312	3.7687
2005	3534.7	967.40	26.303	27.369	7.1987	3.8019
2006	3518.3	975.59	25.978	27.729	7.2033	3.8495
2007	3500.7	985.42	25.646	28.149	7.2192	3.8992
2008	3489.4	997.09	25.363	28.575	7.2474	3.9428
2009	3487.3	1009.7	25.147	28.954	7.2809	3.9767
2010	3495.9	1013.5	25.011	28.990	7.2506	3.9983

W = number of women; WR = ratio of women of childbearing age to total population; and RMBNB = the ratio of MBNB(1) to MBNB (2).

Figure 9.1 shows BNB for 1990–2010. The calculation of BNB for 1982–2000 was based on data from the 1982 One-Per-Thousand Population Sample Survey. As shown in the figure, BNB increases gradually after 1991, reaching its peak (11.724 million) in 1994; thereafter, BNB declines, reaching its lowest value (9.6419 million) in 2005. Today, China is near the peak year of BNB, making the task of population control quite formidable.

Applications of BNB and MBNB

From the data in table 9.1, we can derive information about future population.

Calculation of TFR

$$B(t) = TFR(t) \times BNB(t), \tag{9.6}$$

where $B(t)$ is the number of births. We can easily calculate TFR from BNB once we derive $B(t)$ as follows:

$$TFR(t) = \frac{B(t)}{BNB(t)} . \tag{9.7}$$

Our source for the total population and birthrate for 1990–1992 was the *China Population Statistics Yearbook* for 1993. For example, there were 23.907 million births in 1990 (= 11.3519 million × 2.106). Since the BNB for 1990 is 11.034 million, we have

$$TFR(1990) = \frac{B(1990)}{BNB(1990)} = \frac{23.907}{11.034} = 2.17.$$

In addition,

$$MBNB2 = \frac{BNB}{N} ,$$

where N is total population. So the birthrate $BR = MBNB2 \times TFR$, and

$$TFR = \frac{BR}{MBNB2} . \tag{9.8}$$

It is simpler and more direct to calculate TFR using MBNB than using BNB. We can obtain TFR from birthrate knowing only MBNB2. For example, $MBNB2(1990) = 9.7162$ and $BR(1990) = 21.06$. Then

$$TFR(1990) = \frac{21.06}{9.7192} = 2.16.$$

Table 9.2 shows the TFR for 1990–1993, calculated from (9.7) and (9.8) using the above data and values of BNB and MBNB2 from table 9.1.

Table 9.2. Total fertility rate, 1990–1993

Year	N (10,000)	B (10,000)	BNB (10,000)	MBNB2 (%)	TFR from BNB	TFR from MBNB2
1990	113519	2390.7	1103.4	9.7192	2.17	2.16
1991	115078	2264.7	1134.2	9.8292	2.00	2.01
1992	116479	2124.9	1159.4	9.8619	1.83	1.84
1993	117844	2131.8	1171.0	9.8063	1.82	1.83

As the table shows, the difference between the calculations of TFR using BNB and MBNB2 is negligible.

Projecting Population

Since B(t) = TFR(t) × BNB(t), an increase of only 0.1 in the TFR would result in an additional 6.7842 million births in 1993–1998, 5.9291 million births in 1999–2004, and 4.9268 million births in 2005–2009. Thus, large changes in the number of births result from very small changes in TFR and by extension, the BNB.

$$((TFR + 0.1) \times \sum_{t=1993}^{1998} BNB(t) - TFR \times \sum_{t=1993}^{1998} BNB(t) = 0.1 \times \sum_{t=1993}^{1998} BNB(t) = 0.1 \times \sum_{t=1993}^{1998} BNB(t) = 0.1 \times 6784.2 = 678.42)$$

BNB can be used to project total population for any future year. We let the initial population be $N(t_0)$. If we set gross mortality at 6.7 per 1000 (the average mortality for 1980–1992), the number of people who die in 1994 would total about 8.0 million. It has been estimated that about 8.5 million people will die in 2000, based on projected age-specific death rates, so we set the average annual number of deaths for 1994–2010 at about 8.25 million. The total population in year $t_0 + k$ then is

$$N(t_0 + k) = N(t_0) - (k \times 825) + \left(TFR \times \sum_{t=t_0}^{t_0+k} BNB(t) \right).$$

If N(1993) = 1185.17 million is the initial population, and TFR = 1.85, then

$$N(2000) = N(1993) - (7 \times 825) + \left[1.85 \times \sum_{t=1994}^{2000} BNB(t) \right]$$

$$= 127060.81$$

and N(2000) = 1270.608 million. N(2000) = 1282.218 million or 1301.568 million when TFR = 2.0 and 2.25, respectively.

Calculating Gross Fertility

MBNB2 can be used to calculate gross fertility (GF), which can provide a good estimate of the level of female fertility. The calculation is

$$GF(t) = \frac{\sum_{i=15}^{49} m_i(t)}{\sum_{i=15}^{49} W_i(t)}$$

where $m_i(t)$ is the number of women at age I who have borne children. It can also be written as

$$\begin{aligned} GF(t) &= \frac{\sum_{i=15}^{49} f_i(t) W_i(t)}{\sum_{i=15}^{49} W_i} \\ &= TFR(t) \times \sum_{i=15}^{49} h_i(t) \frac{W_i(t)}{W(t)} \\ &= TFR(t) \times MBNB1(t). \end{aligned}$$

That is, GF = TFR × MBNB1. If we define $MBNB1/2 = \frac{MBNB1}{MBNB2}$, by (9.8) we have

$$GF(t) = \frac{BR(t)}{MBNB2(t)} \times MBNB1(t) = BR(t) \times MBNB1/2 \qquad (9.9)$$

where $BR(t)$ is the birthrate in year t. By (9.9), we have

$$GF(1900) = 21.06 \times \frac{36.242}{9.7192} = 21.06 \times 3.7289 = 78.53 \text{ per 1,000.}$$

Also, $GF(1991)$ = 73.28 per 1,000 and $GF(1992)$ = 67.81 per 1,000.

Moreover, in fertility analysis and population projection, it tends to be appropriate to use MBNB because the effect of migration is negligible in estimating this variable.

Testing Calculations Using BNB and BNBR2

As a test of our procedures, we can calculate TFR using BNB and BNBR2 and then compare the difference between actual data and our calculated results.

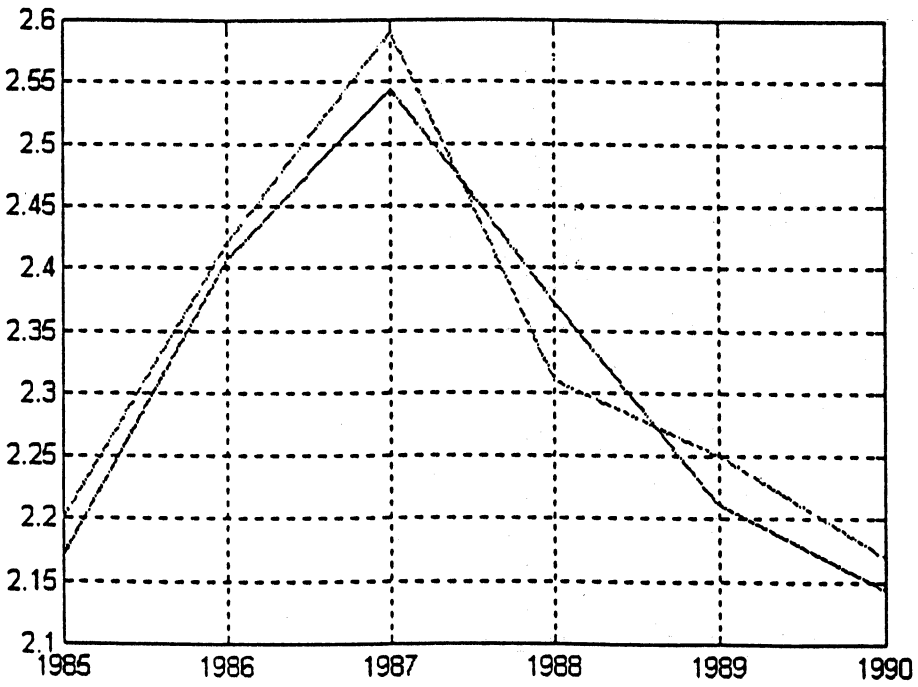
First, using BNB and B for 1985–1990 and applying formula (9.7), TFR is as shown in table 9.3.

Table 9.3. Comparison of actual and calculated total fertility rates, 1985–1990

	1985	1986	1987	1988	1989	1990
Actual	2.20	2.42	2.59	2.31	2.25	2.17
Calculated	2.17	2.41	2.54	2.37	2.21	2.14

The TFR trend figure is shown in figure 9.2.

Figure 9.2. Comparison of actual and calculated total fertility rates, 1985–1990



The data in table 9.3 and figure 9.2 suggest that the difference is very small. Thus, it is feasible to use BNB and B to estimate TFR.

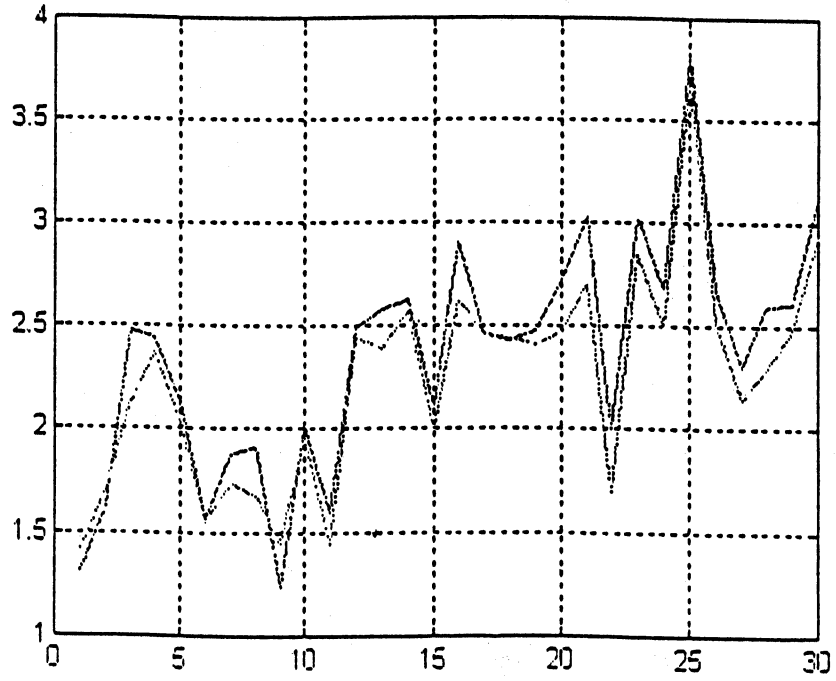
Second, we also can use BNBR2 and BR to estimate TFR by formula (9.8). We used this method to estimate the TFR of 30 provinces for which only 1990 census data are available and then compared our estimates with actual data. Table 9.4 and figure 9.3 show data for nine of these provinces. The differences between the actual and calculated figures are all quite small, meaning that it is feasible to use BNBR2 and BR to estimate TFR.

Table 9-4. Comparison of actual and calculated provincial total fertility rates, 1990

	Beijing	Shanxi	Jilin	Jiangshu	Anhui	Hubei	Hunan	Guangxi	Tibet
Actual	1.31	2.44	1.87	2.01	2.49	2.46	2.43	2.71	3.81
Calculated	1.40	2.37	1.74	1.96	2.44	2.45	2.43	2.46	3.68

The TFR trend figure is given in figure 9.3.

Figure 9.3. Comparison of actual and calculated provincial total fertility rates, 1990



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Appendices

Appendix A

Analysis of the Registration Status of Residents in Survey Sample Areas 1992 National Fertility and Family Planning Survey

Charles H. C. Chen and Qian Wang

By law, Chinese citizens must be members of a household. Households are composed of all family members and relatives who are residing in a common living quarter. All Chinese citizens are required to register their household address and personal information in the household registry at their township office. This personal information includes the relationship of each member to the head of household and key socio-demographic data. If a whole household or some members of the household move within the township their registered address should be changed. If the move is to another township, their registered information is updated by moving from the registry of the old to the new township. By law, all household members must reside in the address of the township where they registered.

Before the 1980s, the laws requiring that all household members reside in their registered address had been followed by virtually all citizens. Two reasons for this were that all employment was assigned by the government and the basic needs for livelihood were rationed through a coupon system. Work assignments and operation of the rationing system is based on the roster of household registry. However, after the economic reform in the 1980s, private jobs have been available in both rural and urban areas, and not all employment was necessarily assigned by the government. In addition, the rationing system was phased out. Therefore, some people may have moved without updating their household registry status and may not actually reside in the registered addresses. In the past, the household registry has been efficiently and accurately used as the sample frame for household surveys. However, with an increasing number of unregistered movers, the use of the household registry as the sample frame for a survey has become an issue since the household registry roster may not reflect the actual residents of the area.

The 1992 national fertility and family planning survey had interviewers visit all households in the selected sample areas. The interviewers enumerated all residents in all households of the sample areas (clusters) and identified their current registration status. This provided the opportunity to analyze the proportion of residents living in their registered household. Thus, we are able to observe the extent to which the current residents were listed in the registry so that the reliability and usefulness of using the registry as a sampling frame may be determined for various geographic areas and for different population groups.

Registration Status of Persons in Sample Areas

To draw the sample areas for the 1992 national family planning survey, a total of 2,301 sample clusters were selected from 658 sample counties and districts in the whole country. A sample cluster is the area unit designated as a residential team. A residential team is a subdivision of a village in rural areas and a residential committee in urban areas. Interviewers visited all the households in the sample clusters. The interviewers determined whether persons registered at each

household still lived there (registered residents) or had moved out (moved out registered residents). They also determined whether any persons lived at the household but were not registered there (unregistered residents).

In conducting the survey, interviewers first enumerated all existing households within a sample cluster. Second, they visited every household and determined whether persons currently residing in the household were registered or not by asking the head of household or the proxy. The interviewers also asked about persons who were registered but not residing in the households.

In all sample areas, there was a total of 385,271 persons enumerated, including 25,237 current residents without registration, 337,799 registered residents, and 22,235 registered residents who moved out (Table A.1). Thus, the total De facto (actual) number of residents were 363,036 and the De jure (registered) population were 360,034. Theoretically speaking, in a national census, the De facto (actual) residents should be equal to the De jure population for the whole country. The difference of 3,002 persons (363,036 - 360,034) less than one percent of the de facto sample, is accounted for by either the members of entire registered households that had moved out and were unable to be enumerated by interviewers and/or survey errors.

Of the persons counted, 6.6 percent were unregistered residents, compared with 5.8 percent who were registered move-outs (table A.2). Compared with the national average, urban areas had a higher percentage of both unregistered residents (18.5 percent) and registered move-outs (7.7 percent); rural areas, by contrast, had lower percentages of both categories (3.8 percent and 5.3 percent, respectively). In rural areas, as the distance to the capital of the county increased, the percentage of unregistered residents decreased, whereas the percentage of registered move-outs increased.

Factors Affecting Residential Status

The proportion of current residents who were registered was related to both personal characteristics and place of resident (table A.3). Just over 93 percent of residents who were in the sample were registered at their current residence. Sex, age, and marital status did not substantially affect registration. Residents with no schooling or primary schooling were more likely to live in their registered households than were those with senior high or higher education. The greatest differentials can be seen between residents of urban areas and residents of rural areas. Only 80 percent of urban residents were registered, compared with 96 percent of residents in rural areas. In rural areas, the proportion of residents who were registered increased as the distance to the county capital increased.

Regional differences in the proportion of residents who were registered, whether in urban or rural areas, were not substantial (table A.4). Disregarding whether residents lived in urban or rural areas, the proportions ranged from 89.4 percent in the Northeast to 95.4 percent in the Southwest. In urban areas, the proportions ranged from 77.7 percent in the East to 84.2 percent in the Northwest. In rural areas, the proportions ranged from 93.1 percent in the Northeast to 97.8 percent in the Southwest.

Among the provinces/municipalities, Beijing had the lowest proportion of registered residents (85.7 percent) and Tibet the highest (99.0 percent). Among urban areas, the proportions ranged from 74.3 percent in Jiangsu to 88.2 percent in Shaanxi (in the Northwest) and 95.3 percent Tibet. In rural areas, the proportions ranged from 88.3 percent in Shanghai to 99.5 percent in Tibet.

Registration Status of Women of Childbearing Age

In a survey of women's health or reproductive health, whether the sample represents all women who are in their childbearing years is naturally of particular concern. A sample drawn from the household registry roster would include only 91.1 percent of women aged 15 to 49 (table A.5). Women aged 15 to 49 who resided in urban areas would be under represented (77.2 percent) to a much greater extent than those in rural areas (94.9 percent). Women aged 20 to 24 years were the most under represented age group; only 85.7 percent were registered. Under representation of this age group was more dramatic in urban areas (69.9 percent) than in rural areas (89.2 percent). Marital status had little bearing on registration. As for education, women of childbearing age who had no schooling were the most likely group to live in their registered household. However, only 67.8 percent of uneducated women living in urban areas had registered. Regional differences in the proportion of women aged 15 to 49 who had registered were not notable.

Registration Status of Ever-Married Women of Childbearing Age

Among ever-married women aged 15 to 49 in the sample, 91.0 percent were registered at their current residence (table A.6). Under representation of women residing in urban areas was greater than that for those in rural areas (77.1 percent vs. 94.3 percent). The likelihood that a woman had registered increased with increasing age, from 71.6 percent for the youngest group to 95.9 percent for the oldest group. It is worth noting that among women aged 20 to 24 in urban areas, only 59.6 percent had registered at their current address. The proportion of women registered also increased by number of children. In urban areas, only 61.2 percent of childless women had registered.

If urban-rural residence is not considered, women with the most education were the least likely to be registered. The pattern was reversed, however, in urban areas. Regional differences in the proportion of women registered were not remarkable.

Conclusion

One of the important contributions of the 1992 national family planning survey was to provide the opportunity to assess the accuracy of the official household registry in the early 1990's. Our analysis indicates that only about 93 percent of residents are registered at their present address. Under representation is more prevalent for some groups than for others, as we have shown here. The discrepancy between urban and rural areas is especially notable. Only 80 percent of urban residents are registered, compared with 96 percent of rural residents. The household registry roster therefore should not be used to draw samples of urban residents. In remote rural areas, the roster can be reliably, efficiently, and conveniently used. However, it is recommended that all future surveys in both urban and rural areas be household based rather than registry based and included the defacto population.

Table A.1. Residential and Registration Status of Persons in Households in Sample Areas

	Number of persons
Current residents not registered	25,237 (a)
Registered Households	
w/ all registered residents	337,799 (b)
w/some registered household members moved out	22,235 (c)
w/ all registered household members moved out*	– (d)
Total counted (a + b + c)	385,271
Actual (de facto) residents (a + b)	363,036
Registered (De jure) population (b + c + d)	360,034

* Number of persons not able to be enumerated in the survey because either the household was empty or current non-registered residents could not tell interviewer basic information for the registered residents who moved out.

Table A.2. Percent Distribution of persons counted in the 1992 survey by residential and registration status by place of residence

Residence	Unregistered residents	Registered		Total	
		Residents	Move-outs		
Total	6.6	87.7	5.8	100	(385,271)
Urban area	18.5	73.8	7.7	100	(72,153)
Rural area	3.8	90.9	5.3	100	(313,118)
Distance to capital of county (for rural areas) (kilometers)					
< 1	10.4	86.1	3.5	100	(7,344)
1–4	7.4	88.8	3.8	100	(33,221)
5–9	4.7	90.9	4.4	100	(38,313)
10–49	3.1	91.4	5.5	100	(185,085)
> 50	2.4	91.1	6.5	100	(48,680)
Unknown	–	–	–	–	(475)

Note: Figures in parentheses are the numbers of persons on which the percentages are based.

Table A.3. Percentage of residents in the sample who were registered by sex by personal characteristics and place of residence

Variable	Total		Male		Female	
Total	93.1	(363,036)	93.3	(184,375)	92.8	(178,661)
Age[a]						
0–14	95.2	(100,318)	95.2	(52,478)	95.1	(47,840)
15–49	91.9	(200,630)	92.4	(101,118)	91.3	(99,512)
50–64	93.6	(40,320)	92.6	(20,863)	94.8	(19,457)
65–79	93.5	(18,949)	93.3	(8,864)	93.7	10,085)
80+	90.3	(2,657)	91.3	(947)	89.7	(1,710)
Marital status						
Never married	94.3	(160,994)	94.4	(87,496)	94.2	(73,498)
Ever married	92.1	(202,042)	92.2	(96,879)	91.9	(105,163)
Education[b]						
None	96.1	(74,405)	96.6	(23,767)	95.8	(50,638)
Primary	94.9	(117,042)	95.3	(61,901)	94.4	(55,141)
Junior high	90.5	(86,114)	91.9	(51,005)	88.6	(35,109)
Senior high or higher	84.5	(35,728)	85.1	(21,627)	83.6	(14,101)
Place of residence						
Urban area	79.9	(66,590)	81.5	(34,117)	78.3	(32,473)
Rural area	96.0	(296,446)	95.9	(150,258)	96.6	(146,188)
Access to capital of county (for rural areas) (kilometers)[c]						
< 1	89.3	(7,085)	88.1	(3,560)	90.4	(3,525)
1–4	92.3	(31,944)	91.6	(16,079)	93.0	(15,865)
5–9	95.1	(36,620)	95.2	(18,560)	95.0	(18,060)
10–49	96.8	(174,816)	96.8	(88,482)	96.7	(86,334)
> 50	97.5	(45,524)	97.5	(23,339)	97.5	(22,185)

Note: Figures in parentheses are the numbers on which percentages are based.

a. Excludes 162 persons of unknown age.

b. Excludes 49,747 children under age 7.

c. Excludes 475 unknown cases.

Table A.4. Percentage of residents in the sample who were registered by urban-rural area by province

Province or municipality	Total		Urban area		Rural area	
Total	93.1	(363,036)	79.9	(66,590)	96.0	(296,446)
North	92.3	(43,779)	80.8	(9,260)	95.4	(34,519)
Beijing	85.7	(4,353)	81.9	(2,252)	89.8	(2,101)
Tianjing	92.4	(2,810)	84.1	(667)	95.0	(2,143)
Hebei	95.6	(18,700)	75.8	(1,234)	97.0	(17,466)
Shanxi	91.4	(10,863)	86.3	(2,527)	93.0	(8,336)
Neimung	89.1	(7,073)	76.1	(2,580)	96.6	(4,473)
Northeast	89.4	(31,142)	82.1	(10,629)	93.1	(20,513)
Liaoning	88.3	(12,198)	78.3	(4,461)	93.9	(7,837)
Jilin	90.2	(7,630)	81.0	(1,156)	91.8	(6,474)
Helongjiang	90.0	(11,314)	85.6	(5,112)	93.6	(6,202)
East	92.4	(127,017)	77.7	(21,638)	95.4	(105,379)
Shanghai	84.5	(3,841)	82.5	(2,507)	88.3	(1,334)
Jiangsu	88.3	(22,927)	74.3	(4,138)	91.3	(18,789)
Jiejiang	94.4	(11,388)	84.0	(1,528)	96.0	(9,860)
Anhuei	95.8	(16,952)	82.4	(2,245)	97.8	(14,707)
Sandong	93.9	(27,531)	81.0	(3,679)	95.9	(23,852)
Henan	96.1	(26,697)	80.5	(2,335)	97.6	(24,362)
Hubei	86.8	(17,681)	70.5	(5,206)	93.5	(12,475)
South	94.0	(78,439)	79.1	(12,329)	96.8	(66,110)
Fujian	93.2	(9,988)	75.2	(1,572)	96.5	(8,416)
Jiangxi	94.4	(11,712)	75.9	(1,685)	97.5	(10,027)
Hunan	94.0	(20,414)	77.6	(2,344)	96.1	(18,070)
Guangdong	93.7	(21,224)	82.8	(5,520)	97.5	(15,704)
Guangxi	95.4	(12,897)	76.1	(915)	96.9	(11,982)
Hainan	90.6	(2,204)	68.9	(293)	93.9	(1,911)
Southwest	95.4	(54,925)	81.1	(8,020)	97.8	(46,905)
Sichuan	95.7	(29,465)	83.1	(3,579)	97.5	(25,886)
Gueijou	94.2	(12,513)	77.3	(2,303)	98.1	(10,210)
Yunnan	95.4	(12,068)	80.9	(2,031)	98.3	(10,037)
Tibet	99.0	(879)	95.3	(107)	99.5	(772)
Northwest	94.3	(27,734)	84.2	(4,714)	96.4	(23,020)
Shaanxi	96.8	(11,100)	88.2	(1,384)	98.0	(9,716)
Kansu	94.1	(8,003)	82.5	(1,580)	97.0	(6,423)
Qinghai	93.3	(1,617)	83.2	(185)	94.6	(1,432)
Ningxia	89.2	(1,449)	76.1	(335)	93.2	(1,114)
Sinjiang	91.3	(5,565)	84.1	(1,230)	93.3	(4,335)

Note: Figures in parentheses are the numbers on which percentages are based.

Table A.5. Percentage of female residents aged 15 to 49 in the sample who were registered by urban-rural area by personal characteristics and region

Variable	Total		Urban area		Rural area	
Total	91.3	(99,512)	77.2	(20,013)	94.9	(79,499)
Age						
15–19	93.0	(16,469)	78.5	(3,062)	96.4	(13,407)
20–24	85.7	(19,185)	69.9	(3,481)	89.2	(15,704)
25–29	88.9	(18,985)	70.9	(3,864)	93.5	(15,121)
30–34	91.8	(11,549)	77.3	(2,775)	96.4	(8,774)
35–39	94.0	(13,874)	80.7	(3,021)	97.7	(10,853)
40–44	95.4	(11,339)	84.9	(2,200)	97.9	(9,139)
45–49	95.8	(8,111)	87.7	(1,610)	97.9	(6,501)
Marital status						
Never married	92.4	(25,566)	77.4	(5,598)	96.6	(19,968)
Ever married	91.0	(73,946)	77.1	(14,415)	94.3	(59,531)
Education						
None	96.7	(22,276)	67.8	(774)	97.7	(21,502)
Primary	94.0	(33,786)	72.0	(2,496)	95.7	(31,290)
Junior high	87.9	(30,187)	74.3	(7,723)	92.6	(22,464)
Senior high or higher	83.3	(13,263)	81.8	(9,200)	86.5	(4,243)
Region						
North	90.9	(12,378)	80.4	(3,210)	94.4	(9,256)
Northeast	87.1	(9,189)	80.2	(3,180)	90.8	(6,009)
East	90.9	(35,062)	75.3	(6,373)	94.3	(28,689)
South	91.5	(20,368)	72.2	(3,602)	95.7	(16,766)
Southwest	94.1	(14,990)	77.0	(2,270)	97.2	(12,720)
Northwest	93.2	(7,527)	84.4	(1,468)	95.3	(6,059)

Note: Figures in parentheses are the numbers of persons on which percentages are based.

Table A.6. Percentage of ever-married women aged 15 to 49 in the sample who were registered by urban-rural area by personal characteristics and region

Variable	Total		Urban area		Rural area	
Total	91.0	(73,946)	77.1	(14,415)	94.3	(59,531)
Age						
15–19	71.6	(464)	*	(11)	72.9	(453)
20–24	81.6	(10,581)	59.6	(1,326)	84.8	(9,255)
25–29	89.0	(18,184)	70.9	(3,548)	93.4	(14,436)
30–34	91.9	(11,450)	77.3	(2,723)	96.4	(8,727)
35–39	94.0	(13,842)	80.7	(3,007)	97.7	(10,835)
40–44	95.4	(11,326)	84.9	(2,193)	97.9	(9,133)
45–49	95.9	(8,099)	87.7	(1,607)	97.9	(6,492)
Number of children						
0	73.4	(5,207)	61.2	(1,192)	77.0	(4,015)
1	85.4	(23,519)	76.8	(8,557)	90.3	(14,962)
2	94.7	(24,144)	80.7	(3,147)	96.8	(20,997)
3 +	97.2	(21,076)	83.3	(1,519)	98.3	(19,557)
Education						
None	96.6	(20,000)	68.5	(707)	97.6	(19,293)
Primary	93.2	(25,432)	75.3	(2,176)	94.8	(23,256)
Junior high	86.5	(19,836)	76.7	(5,687)	90.5	(14,149)
Senior high or higher	81.6	(8,678)	79.1	(5,845)	86.7	(2,833)
Region						
North	90.1	(9,160)	76.0	(1,905)	93.8	(7,255)
Northeast	86.0	(7,093)	78.9	(2,474)	89.8	(4,619)
East	90.6	(26,355)	75.7	(4,773)	93.9	(21,582)
South	91.7	(14,780)	75.8	(2,501)	95.0	(12,279)
Southwest	93.6	(10,967)	77.4	(1,736)	96.6	(9,225)
Northwest	92.9	(5,597)	83.7	(1,026)	95.0	(4,571)

Note: Figures in parentheses are the numbers of persons on which percentages are based.

* The percentage is not useful for purposes of comparison because there were so few cases.

Appendix B

Estimation and Analysis of Sampling Errors for the 1992 National Fertility and Family Planning Survey

Hao Hongsheng and Gao Ling

This appendix estimates and analyzes the sampling errors for selected demographic measures and statistics for complex designs such as design effects and intraclass correlation for the national sample survey in 1992 conducted by the State Commission on Family Planning of China.

Design, Data, and Software

The sampling design used for the survey was stratified two-stage cluster systematic sampling. For the first-stage selection, the 30 provinces of China were used as strata, and counties (including county-level units) were used as primary sampling units (PSUs). The sampling fraction for the first-stage selection was 1/4. For the second stage, the villager groups in rural areas and the residential groups in urban areas were used as sampling units. Once selected, all households in either group were included in the sample as a cluster. The sampling fraction for the second stage selection was 1.3 per thousand. The planned sample size was 300,000 people (6). The software used for computing the sampling errors was CLUSTERS, a package program for computing sampling errors for clustered samples that was developed for the World Fertility Survey. The program can compute standard errors and certain statistics derived from standard errors for sample estimates such as proportions, means, and ratios from complex stratified multistage designs. The computation is based on the Taylor Series approximation method, described in the manual for the software (7).

Before the computation was performed, the data were rearranged according to the software package's requirement regarding format. Because the sampling fractions varied slightly among provinces, we assigned weights to each case by province, according to the sampling fraction for each province; thus, all computation results were weighted. In the computation, provinces were treated as strata as well as domains, and two subclasses were formed -- an agricultural subclass and a nonagricultural subclass. The prepared data for computation consisted of 658 PSUs in 30 strata. The number of cases was 358,271; 313,118 for the agricultural subclass and 72,153 for the nonagricultural subclass.

A survey's total error consists of two main components: sampling error and nonsampling error. Since our intention was to estimate sampling errors, which should be independent of nonsampling errors such as bias and measurement error, all statistics were calculated based on the original data without adjustment for possible under reporting.

Results of Sampling Error Computation

We selected 11 variables from the original survey data that are typical demographic measures divided into four categories to compute the sample estimates and their standard errors, with emphasis on fertility measures. The four categories are fertility, marriage, birth control, and mortality. For all selected variables we computed the sample estimates, the corresponding standard errors for the total sample, the two subclasses, and the 30 domains. Since the sampling errors in absolute terms have the same units as the corresponding variables, direct comparison between the sampling errors of different variables cannot be made. The relative errors for all variables are therefore also presented. For certain variables computation was accomplished for three consecutive years (1990 1992) to show recent trends.

Although we computed sampling errors by province (domain) for all eleven variables, only a few are presented here because (1) space is limited and (2) some variables are subject to very large sampling errors due to small provincial sample sizes and therefore are not statistically meaningful for making inferences about the provincial-level populations.

Sampling Errors for Fertility Measures

Crude birth rate

The national and provincial crude birth rate (CBR) estimates and their sampling errors for 1990-1992 are presented in tables B.1 and B.2 respectively. The crude birth rate can be calculated using two criteria: (1) births that occurred within these three years based on answers to a question asked of all people who participated in the survey; and (2) births reported by mother who participated in the survey. The birth rates based on the second criterion are generally slightly higher than those based on the first criterion. The sampling errors for the birth rates of both the total sample and the agriculture subclass are very small. Relative errors are below 2% (table B.1). The sampling errors for the non-agriculture subclass are larger due to the smaller sample size, but the relative errors are still lower than 5%. In terms of sampling error, the estimated birth rates for the national population and the two subclasses are very precise.

Large differences in sample size resulted in considerable variation in the sampling errors for the provincial birth rates. For the purpose of analysis, we can classify the relative errors into three categories: below 5%, small; between 5% and 10%, medium; and higher than 10%, large. More than half (104) of the 180 birth rate estimates (there are two criteria for each of 30 provinces and data are for three years) have a medium error; nearly 40% (70) have a large error, and only 3% (6, all for large provinces) have a small error. The results imply that for most provinces, especially the small ones, sampling error is a factor that must not be ignored in comparing and making inferences about provincial birth rates.

General fertility rate

The sample general fertility rate (GFR) estimates, sampling errors, and the related statistics for the total sample and the two subclasses are shown in table. B.3. The sample sizes for the GFRs are smaller than those for the CBRs, since the GFR measure captures only women of childbearing ages. In relative terms, however, the sampling errors for the GFRs are similar to those of the CBRs, because the GFRs as denominators for the relative errors have much higher absolute values than do the CBRs and hence cancel out the increase in the standard errors.

Age-specific fertility rate and total fertility rate

The age-specific fertility rates (ASFR) and the total fertility rate (TFR) are the most commonly used measures for examining fertility levels and patterns. The ASFRs by five-year age group and their sampling errors for 1990-1992 are presented for the total sample, the agriculture subclass, and the nonagriculture subclass in tables B.4a, B.4b, and B.4c, respectively. Because the ASFRs were calculated by age group, smaller sample sizes result in larger sampling errors. Also, the standard errors for different age groups vary greatly with the variation of the ASFRs: higher ASFRs have a smaller relative error. For the total sample and the agriculture subclass (tables B.4a and B.4b), the relative errors of the peak ASFR age group (20- 24 years) are only 2%; those of the 25-29 age group are also very small, for the most part between 2% and 3%; however, those of the low-fertility age group 45-49 range from 30% to 70%. The current fertility age pattern of women in China is characterized by a high degree of concentration in the 20-24 and 25-29 age groups. As long as the sampling errors for these two groups are low, the precision of inferences about fertility levels and patterns of the population will be high.

The sampling errors for the nonagriculture subclass (table B.4c) are considerably larger than those for either the total sample or the agriculture subclass because of the smaller sample size. Nonetheless the relative errors of 5% to 7% for the two age groups (20-24 and 25-29) mean that inferences can still be made with reasonable precision.

The TFR is a linear combination of the age-specific fertility rates of all age groups. Accordingly, the sampling variance for the TFR should include both the sampling variance and the covariance of its ASFR components. However, the CLUSTERS software cannot compute covariance. We therefore used an approximate method adopted for the World Fertility Survey program. The first step is to calculate the simple random sampling (SRS) variance for the TFR as a sum of the SRS variances of the ASFRs without covariance. The second step is to estimate the sampling variance for the TFR by multiplying its estimated SRS variance by the design effect (deff) of the GFR. Because the deff of the TFR is expected to be smaller than that of the GFR, this procedure tends to slightly overestimate the true sampling variance of the TFR (5).

The sampling errors derived using the described procedure are presented in table B.5. The relative errors of the TFRs for the total sample (below 2%) and the agriculture and nonagriculture subclasses (under 2% and around 5%, respectively) are very close to those of the CBRs and the GFRs. In addition, the relative error of the TFR for the total sample is almost identical to that for the 1982 one-per-thousand fertility survey (1). The sampling errors of the TFRs at the provincial

level (table B.5) vary greatly, like the CBRs; the relative errors of the provinces are also very close to those of the CBRs. This finding suggests that we can use the relative sampling error level of the CBR to approximate that of the TFR. The distribution of the relative errors of the TFRs (table B.5) is also close to that of the CBRs (table B.2): slightly more than half of the TFRs have a relative error between 5% and 10% , and most of the rest are above 10%. Thus, when making inferences about the provincial TFRs, the same caution applies as for the provincial CBRs.

Women's children ever born and children surviving

Children ever born (CEB) and children surviving (CS) by mother's five year age groups and their sampling errors are presented for 1992 for the total sample and the two subclasses in tables B.6 and B.7, respectively. Although the sample has been divided into smaller-size groups similar to those of the ASFRs, the relative errors of the CEBs and the CSs are smaller, and increasingly smaller than those of the ASFRs, as age increases. The reason for this difference is that the CEB and the CS are cumulative measures of fertility experiences by cohort up to the time of survey; thus, as the women get older, the values of the measures increase and hence reduce the relative errors. For the total sample and the agriculture subclass, the relative errors of both variables for most age groups are between 1% and 2%; for the nonagriculture subclass, the relative errors are generally between 2% and 3% (tables B.6 and B.7). These two sets of estimates therefore have very high precision.

Birth-order proportions

For births between 1990 and 1992, we calculated the proportions of first-order, second-order, and third and higher-order births and their sampling errors by year (table B.8). The sample sizes for this measure are much smaller than those for the fertility measures discussed previously, because the samples for birth-order proportions involve only the births that occur within one year. The relative errors of the measure are not necessarily large, because the relative error depends partly on the proportion value. The first birth has the highest proportion, and thus the smallest relative error, for the total sample and the two subclasses. First-order births, however, are not the major concern; rather, we are interested in later births, especially third and higher-order births, which are the main targets of the family planning program. For the total sample and the agriculture subclass, the relative errors of third and higher-order generally between 2% and 6%, which are sufficiently low for making inferences. For the nonagriculture subclass, the errors of these later births are too large: over 10% for second births and over 20% or even 30% for third and higher-order births. The size of the errors is due to both the sample sizes and the low proportions of this subclass. For the provinces, whose sample sizes are even smaller than those of the nonagriculture subclass, the errors of third and higher-order births are also too large to be acceptable for statistical inference (data not shown).

Sampling Errors for Other Variables

Mean age at first marriage

Table B.9 shows the sampling error of the mean age at first marriage by sex for the total sample and the two subclasses for 1990 1992. The relative errors in the table are below 1%, and generally around 0.3%, for the total sample and the agriculture subclass. Such small errors might be partly due to the 1981 Marriage Law (the law set 20 years as the legal age for marriage).. We will show later that the mean cluster sizes for this variable are the smallest among all variables, which may help reduce the design effect.

Use of contraception

To calculate the sampling errors, we grouped the various types of contraceptive methods into two categories: long term-effect methods, namely, vasectomy, tubal ligation, and the intrauterine device (IUD) and short term-effect methods, including the oral pill, injection, condom, and other methods. The sampling errors for the total sample and the subclasses are displayed in table B.10. The long term-effect methods are used by the majority of contraceptive users, and their relative errors are much smaller than those of the short term-effect methods. The precision of both categories is adequate for making inferences about the total population and the two subclasses. However, the precision would be reduced considerably if the sampling errors were calculated by individual contraceptive method.

Crude death rate and infant mortality rate

Table B.11 shows the crude death rates (CDRs) and the (IMRs) for 1992 and their sampling errors for the total sample and the subclasses. Although the sample sizes for the CDRs are the same as those for the CBRs and the standard errors are smaller, the relative errors are larger because the CDRs have much lower values than do the CBRs. For the total sample and the agriculture subclass, the precision is fairly good; for the nonagriculture subclass, the precision however, is quite low. The precision is even lower for provinces. Because infant mortality involves a only very small part of the sample, a relatively large sampling error can be expected. Even the relative error for the IMR of the total sample for the two sexes combined, the lowest among the IMRs in table B.11, is as high as 7.7%, implying a 95% confidence interval between 32.5 and 44.3 per thousand. For subclasses and for the IMRs by sex, the errors are all very large; for the provincial IMRs, the precision is even poorer.

Design Effect and Rate of Homogeneity

The design effect (deff) and the rate of homogeneity (roh) are two important statistics derived from sampling error computation that from a sampling design point of view, are more useful than sampling errors as aids in the design of similar surveys. Deff is the ratio of the actual sampling variance of a complex sample to that of a simple random sample of the same size (2). Deft is a related measure; it is the ratio of the standard error of a complex sample to that of a simple random sample. The deft is the square root of the deff. Both the deff and the deft express the relative efficiency of a certain design, especially that of clustering and stratification. The CLUSTERS package gives estimates for the deft, from which the deff estimate can be calculated.

The deff is determined by two factors: intraclass correlation, a measure of the extent of homogeneity within clusters, which is measured by roh; and cluster size, b, or mean cluster size for unequal-size clusters, which is the average number of respondents in each PSU (2). Randomly distributed variables have roh values near zero. By contrast, variables with a high degree of within-cluster homogeneity typically have roh values around 0.1 or 0.2. For the same roh value, a larger mean cluster size will lead to a higher deff. For each sample estimate, the CLUSTERS package gives both the roh estimate and the deft estimate, and hence facilitates the analysis of the deff. It should be noted that the cluster sizes are different for different variables because they involve different groups of people in the sample. The design effects are very different between variables because intraclass correlation and cluster size vary considerably. The variables contraceptive use, children ever born, and children surviving, for example, have very high deft values because of their large cluster sizes, while the corresponding roh values are just about average. The high deft values for CEB and CS are caused by their unusually high roh values, the highest among the variables being examined (tables B.6 and B.7). We are surprised by roh values of this magnitudes; they merit further investigation.

The differences in the deft and the roh values also exist among different regions, which are also strata and domains in this survey. Table B.12 lists the regional mean deft and the roh values for different variables, averaged over subgroups such as age group, sex, and year and weighted by subgroup size; we did not include those values for CEB and CS because we question their roh estimates. The deft and the roh values both vary greatly from variable to variable, and fluctuate across regions. In addition, there is a fairly high correlation between the variables' deft values by region. For instance, the correlation between the regional defts for the CBR and the GFR is 0.68, and that between the GFR and the ASFR is 0.71. Correlation also can be detected between some other variables. This finding implies that if a region has high deft value for one variable, it will tend to have high deft values for other variables. Such correlation in the deft values can be attributed to both regional roh's and cluster sizes. With respect to the regional roh values, somewhat lower correlation between variables also exists, implying that there is a certain degree of consistency in homogeneity among the variables for the same region.

Since the deft and the roh values computed from sample data are also sample estimates, they are subject to sampling variability. Some roh values are negative and result in deft values lower than 1 because of variability (table B.12). To provide empirical reference for sampling designs of similar surveys, more stable deft and roh estimates are needed. For this reason, we also calculated the mean values of the deft and the roh for all regions by variable. The mean value of the deft ranges from about 1 to over 3, implying a range of deff values from about 1 to 9. For most variables, however, the deft values are below 1.5. The mean roh values also vary in a large range, from about 0 to over 0.2, but for the most part are below 0.1.

Among the fertility variables, the CBR and the GFR have very low roh values; their deft values however, are not the lowest because of the large mean cluster sizes for the two variables (586 and 160, respectively). The lowest mean deft value is that for the ASFRs; the low value can be attributed to the variables small mean cluster size (23) and fairly low roh value. The mean roh value

of 0.019 is a result of the age group roh values ranging between 0.01 and 0.03. This result is very close to that of the World Fertility Survey, based on eight surveys from five countries or regions (3), and that of the 1982 One-per-Thousand Fertility Survey in China (4). This similarity suggests that the roh values for fertility have good stability over time and across regions.

The variables with rather high roh values are the birth order proportions and the mean age at first marriage. The deft values are not high, however, because the mean cluster sizes for these two variables are very small (9 and 5, respectively). The contraceptive use variables have very high deft values, the highest of all the variables, because of their large cluster size (110). The mortality variables have the lowest deft values of all the variables: The deft value are close to 1 for both the crude death rate and the infant mortality rate. This is because the roh values for both variables are so low at their effects on the deft values are almost negligible. For the CDR, the roh values are virtually zero, suggesting that the variable is randomly distributed. Compared with the fertility variables, the mortality variables show lower deft and roh values in general.

Conclusion

Except for a few variables, such as, infant mortality, the estimates for the total sample have either low or very low levels of sampling error, with most relative errors below 3%. Most of the age-specific rates have high levels of precision. We can therefore deduce that, for most of the variables for which we did not calculate sampling errors, inferences at the national level would have very good or reasonable precision. Of the two subclasses, the agriculture subclass has better precision because its sample size is much larger. It's sample size in fact accounts for more than 80% of the total sample making its precision close to that of the total sample. The precision of most of the variables for the nonagriculture subclass is fairly good. For instance, the relative errors for the fertility variables are for the most part around 5%. For some variables, however, the precision is lower. Thus, the sampling error cannot be overlooked in making inferences about this subclass. The provincial-level sampling errors presented for selected variables vary considerably. For some variables, slightly more than half of the provinces have fairly good or merely acceptable precision, and nearly half of the provinces are subject to very large sampling errors. For other variables, by contrast, the precision is poor for all provinces. Sampling error is therefore a factor that one must consider in the analysis at the provincial level. The examination of the design effects shows that even though the intraclass correlation and the deft values vary among the variables studied most variables have a mean deft value below 1.5 and a mean roh value below 0.1. The estimated defts and rohs can be used to guide the sampling design of similar surveys.

Based on our analysis, we offer two suggestions about sample size that may prove useful to researchers designing fertility surveys. First, since the total error of a sample contains both sampling and non sampling errors, a roughly equal level for the two kinds of errors should be sought to minimize the total error. Although increasing the sample size will reduce the sampling error, it may also make quality control more difficult and hence increase the chance of introducing more non sampling error. In some cases, researchers would be advised to accept a larger sampling error to minimize the total error. If the purpose of a survey is to make inferences at the national level,

choosing a smaller sample size may even reduce the total error by allowing a better balance between the two kinds of errors. Another advantage is lower survey costs. Second, if a survey also aims at making inferences and comparisons at the provincial level- that is, if provinces are domains of study-then one should increase the sample sizes for some smaller provinces and allocate the sample size more evenly among the provinces. In so doing, a certain level of precision will be assured for most provinces similar levels of sampling error will be achieved, and drastic variation in the sampling error at the provincial level will be avoided.

In conclusion, we can say from our examination of sampling errors that the 1992 sample survey data have high levels of precision at the national level. Our examination of the design effects for most variables leads us to the view that the sampling design is fairly efficient in terms of stratification and clustering. The information about sampling errors and the related statistics (especially the deft and roh values) gained through this survey presents a valuable source of reference for designing similar surveys in China.

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Table B.1. Sampling errors and related statistics for crude birth rates, 1990-1992

Class and calculation method[1]	Year	CBR	SE	Deft	Roh	SE/r
China						
Criterion 1	1990	19.95	0.330	1.43	0.002	0.017
	1991	16.87	0.271	1.29	0.001	0.016
	1992	14.10	0.268	1.16	0.001	0.019
Criterion 2	1990	20.37	0.334	1.43	0.002	0.016
	1991	17.04	0.280	1.32	0.001	0.016
	1992	16.42	0.295	1.17	0.001	0.018
Agriculture						
Criterion 1	1990	21.60	0.364	1.37	0.002	0.017
	1991	17.97	0.304	1.26	0.001	0.017
	1992	14.57	0.296	1.13	0.001	0.020
Criterion 2	1990	22.06	0.368	1.36	0.002	0.017
	1991	18.16	0.313	1.28	0.001	0.017
	1992	16.99	0.328	1.16	0.001	0.019
Non-agriculture						
Criterion 1	1990	12.72	0.553	1.31	0.007	0.043
	1991	12.05	0.532	1.30	0.006	0.044
	1992	12.06	0.606	1.23	0.005	0.050
Criterion 2	1990	13.00	0.594	1.39	0.008	0.046
	1991	12.09	0.542	1.31	0.007	0.045
	1992	13.90	0.650	1.21	0.004	0.047

[1] : Criterion 1 is based on births identified by a question about time of birth that all respondents were asked to answer.

Criterion 2 is based on births reported by mothers.

Table B.2. Sampling errors for crude birth rates by province, 1990-1992

Province	1990						1991						1992					
	CBR1	SE	SE/r	CBR2	SE	SE/r	CBR1	SE	SE/r	CBR2	SE	SE/r	CBR1	SE	SE/r	CBR2	SE	SE/r
China	20.0	0.33	0.017	20.4	0.33	0.016	16.9	0.27	0.016	17.0	0.28	0.016	14.1	0.27	0.019	16.4	0.30	0.018
North																		
Beijing	13.4	2.07	0.154	13.0	2.23	0.171	10.4	1.60	0.154	10.0	1.33	0.133	12.3	3.27	0.265	14.2	3.75	0.264
Tianjin	15.0	2.37	0.158	15.7	1.97	0.125	11.1	2.23	0.201	12.1	1.82	0.150	13.1	2.72	0.208	15.6	2.77	0.177
Hebei	21.8	1.23	0.057	22.0	1.14	0.052	16.7	1.08	0.065	17.1	1.13	0.066	12.3	0.85	0.069	14.3	0.87	0.061
Shanxi	23.0	1.91	0.083	23.6	1.90	0.080	17.9	1.56	0.087	18.4	1.66	0.090	19.3	2.15	0.111	21.4	1.97	0.092
In. Mongolia	19.5	1.56	0.080	20.5	1.80	0.088	14.3	2.21	0.154	15.3	2.09	0.137	16.1	2.55	0.159	20.0	2.19	0.110
Northeast																		
Liaoning	13.9	1.75	0.126	14.1	1.59	0.113	12.8	1.16	0.091	13.0	1.13	0.087	11.6	1.10	0.095	13.9	1.29	0.093
Jilin	17.9	2.78	0.155	19.2	2.78	0.145	13.4	1.27	0.095	14.8	1.32	0.089	15.0	1.89	0.126	17.2	2.26	0.132
Heilongjiang	18.7	1.24	0.066	19.2	1.19	0.062	10.9	0.81	0.074	11.4	0.99	0.086	13.0	1.41	0.108	15.5	1.87	0.121
East																		
Shanghai	8.7	1.44	0.165	9.0	1.28	0.143	10.1	0.94	0.093	10.4	1.32	0.127	8.1	2.09	0.258	10.2	2.61	0.256
Jiangsu	20.5	2.30	0.112	20.6	2.37	0.115	15.7	1.25	0.079	16.5	1.40	0.085	11.8	0.93	0.079	13.7	1.01	0.074
Zhejiang	13.9	1.14	0.082	14.7	1.18	0.080	10.5	0.84	0.081	10.9	1.24	0.114	8.5	0.88	0.102	10.8	1.10	0.101
Anhui	22.3	1.53	0.068	22.5	1.51	0.067	20.7	1.21	0.059	20.3	1.24	0.061	13.5	1.23	0.092	15.6	1.41	0.090
Fujian	21.9	2.08	0.095	22.7	2.36	0.104	17.8	1.71	0.096	18.0	2.06	0.114	13.6	1.57	0.115	16.9	1.67	0.099
Jiangxi	23.6	1.51	0.064	24.0	1.42	0.059	20.2	1.27	0.063	19.9	1.15	0.058	10.2	0.91	0.089	13.2	1.53	0.116
Shandong	19.9	1.54	0.077	19.6	1.46	0.075	13.0	0.84	0.065	12.4	0.90	0.072	7.6	0.70	0.092	9.1	0.78	0.086
Henan	22.8	1.17	0.051	22.7	1.13	0.050	19.6	1.22	0.062	18.8	1.19	0.063	15.6	1.14	0.073	17.8	1.20	0.067
South																		
Hubei	21.7	1.61	0.074	22.2	1.72	0.077	21.1	1.57	0.074	20.2	1.66	0.083	16.2	1.11	0.068	18.9	1.27	0.067
Hunan	21.7	0.96	0.044	22.5	1.11	0.049	16.6	0.96	0.058	17.3	1.08	0.063	11.2	0.89	0.079	13.7	0.96	0.070
Guangdong	19.3	1.05	0.054	19.5	0.92	0.047	19.1	0.99	0.052	18.9	0.90	0.047	18.0	0.94	0.052	19.1	1.08	0.056
Guangxi	15.1	1.24	0.082	16.4	1.50	0.092	14.0	1.08	0.077	14.4	1.29	0.090	14.6	1.35	0.092	17.3	1.57	0.091
Hainan	27.3	3.80	0.139	30.2	4.55	0.151	26.2	5.68	0.216	28.9	3.63	0.126	23.4	5.19	0.222	30.6	3.14	0.103
Southwest																		
Sichuan	17.4	1.00	0.058	17.9	1.09	0.061	16.2	0.84	0.052	16.9	0.90	0.053	14.6	0.96	0.066	16.4	0.96	0.058
Guizhou	19.5	1.84	0.094	21.0	2.05	0.097	20.6	2.18	0.106	20.0	2.24	0.112	19.2	1.19	0.062	22.1	1.00	0.045
Yunnan	20.6	1.57	0.076	21.3	1.80	0.084	19.7	1.38	0.070	19.9	1.39	0.070	18.8	1.63	0.087	22.4	2.14	0.096
Tibet	31.3	4.69	0.150	32.2	5.01	0.155	15.9	6.40	0.403	14.8	4.88	0.329	32.7	6.82	0.208	37.7	7.40	0.196

Table B.2. Sampling errors for crude birth rates by province, 1990-1992 (continued)

Province	1990						1991						1992					
	CBR1	SE	SE/r	CBR2	SE	SE/r	CBR1	SE	SE/r	CBR2	SE	SE/r	CBR1	SE	SE/r	CBR2	SE	SE/r
Shaanxi	21.3	1.63	0.077	21.3	1.53	0.072	21.1	1.89	0.090	20.6	1.73	0.084	20.4	2.02	0.099	23.5	2.00	0.085
Gansu	27.1	1.74	0.064	28.0	1.89	0.067	20.4	1.86	0.091	21.6	2.16	0.100	18.7	1.19	0.064	21.2	1.47	0.070
Qinghai	29.2	4.37	0.150	29.7	4.79	0.161	23.7	2.81	0.119	23.8	3.87	0.163	14.1	3.96	0.281	17.6	4.63	0.263
Ningxia	20.4	4.41	0.216	21.1	4.41	0.209	18.8	3.36	0.178	18.8	2.68	0.142	17.5	4.62	0.264	17.5	4.23	0.242
Xinjiang	22.7	2.53	0.111	22.7	2.95	0.130	21.9	1.63	0.074	24.5	1.60	0.065	21.3	2.97	0.140	24.8	2.94	0.118

Table B.3. Sampling errors and related statistics for general fertility rates, 1990-1992

Class	year	GFR	SE	n	Deft	Roh	SE/r
China							
	1990	74.18	1.33	10,3386	1.62	0.010	0.018
	1991	61.53	1.09	10,5356	1.46	0.007	0.018
	1992	58.96	1.11	10,6968	1.25	0.003	0.019
Agriculture							
	1990	82.01	1.45	82,063	1.50	0.010	0.018
	1991	66.95	1.21	83,737	1.38	0.007	0.018
	1992	62.20	1.23	85,178	1.21	0.004	0.020
Non-agriculture							
	1990	43.41	2.03	21,323	1.45	0.035	0.047
	1991	40.07	1.93	21,619	1.43	0.033	0.048
	1992	46.02	2.40	21,790	1.37	0.027	0.052

Table B.4a. Sampling errors and related statistics for age-specific fertility rates: China, 1990-1992

Year	age group	ASFR	SE	n	Deft	Roh	SE/r
1990	15-19	16.0	1.13	19,664	1.25	0.020	0.070
	20-24	181.0	3.64	21,606	1.38	0.028	0.020
	25-29	145.0	3.55	17,643	1.33	0.029	0.024
	30-34	48.3	2.29	12,970	1.21	0.025	0.047
	35-39	16.1	1.14	13,578	1.06	0.006	0.071
	40-44	3.2	0.56	10,233	1.01	0.001	0.176
	45-49	1.2	0.39	7,692	0.99	-0.001	0.329
1991	15-19	15.9	1.22	18,836	1.33	0.027	0.077
	20-24	159.9	3.09	21,773	1.23	0.016	0.019
	25-29	106.3	2.96	20,053	1.35	0.027	0.028
	30-34	34.1	1.94	12,017	1.17	0.021	0.057
	35-39	8.8	0.86	14,024	1.09	0.009	0.098
	40-44	3.3	0.64	10,860	1.17	0.024	0.197
	45-49	0.3	0.19	7,793	1.03	0.006	0.708
1992	15-19	9.6	0.99	18,116	1.12	0.001	0.103
	20-24	156.0	3.44	21,885	1.12	0.008	0.022
	25-29	105.3	3.13	20,779	1.18	0.013	0.003
	30-34	31.1	2.15	12,137	1.11	0.014	0.069
	35-39	8.0	0.99	14,301	1.05	0.005	0.124
	40-44	2.3	0.57	11,542	1.06	0.007	0.246
	45-49	1.0	0.46	8,208	1.09	0.017	0.462

Table B.4b. Sampling errors and related statistics for age-specific fertility rates: Agriculture, 1990-1992

Year and Age Group		ASFR	SE	n	Deft	Roh	SE/r
1990	15-19	18.5	1.28	1,6195	1.21	0.019	0.069
	20-24	200.4	3.83	1,7562	1.26	0.023	0.019
	25-29	157.1	4.16	1,3546	1.31	0.037	0.026
	30-34	57.0	2.73	9,757	1.15	0.024	0.048
	35-39	17.7	1.33	1,0775	1.05	0.007	0.075
	40-44	3.8	0.69	8,205	1.01	0.002	0.018
	45-49	1.5	0.49	6,023	0.99	-0.003	0.329
1991	15-19	18.6	1.38	15,483	1.26	0.026	0.074
	20-24	172.4	3.25	17,741	1.14	0.011	0.019
	25-29	112.8	3.47	15,658	1.35	0.037	0.031
	30-34	39.5	2.39	8,961	1.16	0.028	0.061
	35-39	9.9	1.03	11,053	1.09	0.011	0.103
	40-44	3.5	0.69	8,673	1.09	0.015	0.197
	45-49	0.3	0.24	6,168	1.03	0.007	0.708
1992	15-19	11.3	1.13	14,854	1.08	0.007	0.001
	20-24	165.3	3.75	17,889	1.08	0.006	0.023
	25-29	104.4	3.52	16,452	1.19	0.017	0.034
	30-34	35.6	2.48	9,083	1.04	0.006	0.007
	35-39	8.8	1.17	11,113	1.05	0.006	0.133
	40-44	2.9	0.71	9,235	1.05	0.008	0.245
	45-49	1.2	0.57	6,552	1.09	0.021	0.462

Table B.4c. Sampling errors and related statistics for age-specific fertility rates: Non-agriculture, 1990-1992

Year and age group		ASFR	SE	n	Deft	Roh[1]	SE/r
1990	15-19	4.1	1.21	3,469	1.12	_	0.297
	20-24	94.9	6.08	4,044	1.32	0.142	0.064
	25-29	104.3	5.44	4,097	1.13	0.055	0.052
	30-34	21.6	2.67	3,213	1.04	_	0.124
	35-39	10.0	1.95	2,803	1.04	_	0.195
	40-44	0.5	0.53	2,028	1.03	_	0.996
	45-49	0.0	0.00	1,669	0.00	_	0.000
1991	15-19	2.6	0.95	3,353	1.09	_	0.371
	20-24	103.8	6.04	4,032	1.25	0.108	0.058
	25-29	82.7	4.84	4,395	1.16	0.061	0.059
	30-34	18.0	2.59	3,056	1.06	_	0.144
	35-39	4.7	1.30	2,971	1.03	_	0.276
	40-44	2.3	1.19	2,187	1.15	_	0.513
	45-49	0.0	0.00	1,625	0.00	_	0.000
1992	15-19	1.8	0.93	3,262	1.04	_	0.515
	20-24	113.4	7.84	3,996	1.25	0.11	0.069
	25-29	108.9	6.44	4,327	1.09	0.035	0.059
	30-34	17.6	3.63	3,054	1.26	_	0.206
	35-39	5.2	1.67	3,188	0.99	_	0.320
	40-44	0.0	0.00	2,307	0.00	_	0.000
	45-49	0.0	0.00	1,656	0.00	_	0.000

[1]: The CLUSTERS package will not give the roh values if the mean cluster size is smaller than 6.

Table B.5. Sampling errors for the total fertility rates for China, the two subclasses, and the provinces, 1990-1992

Class or Province	1990			1991			1992		
	TFR	SE	SE/r	TFR	SE	SE/r	TFR	SE	SE/r
China	2.05	0.036	0.018	1.64	0.029	0.018	1.57	0.03	0.019
Agriculture	2.28	0.040	0.018	1.79	0.032	0.018	1.65	0.033	0.020
Non-agriculture	1.18	0.056	0.048	1.07	0.051	0.048	1.23	0.055	0.052
North									
Beijing	1.31	0.231	0.176	0.99	0.139	0.140	1.44	0.358	0.249
Tianjin	1.60	0.243	0.152	1.14	0.190	0.166	1.60	0.292	0.182
Hebei	2.37	0.122	0.052	1.78	0.120	0.067	1.49	0.106	0.071
Shanxi	2.38	0.282	0.119	1.81	0.240	0.133	2.09	0.306	0.147
In. Mongol	1.90	0.184	0.097	1.37	0.188	0.137	1.82	0.201	0.110
Northwest									
Liaoning	1.31	0.152	0.115	1.21	0.106	0.087	1.23	0.119	0.097
Jilin	1.78	0.273	0.153	1.29	0.116	0.089	1.47	0.187	0.128
Heilongjiang	1.80	0.121	0.067	1.01	0.091	0.089	1.32	0.160	0.121
East									
Shanghai	1.05	0.176	0.167	1.36	0.205	0.151	1.43	0.343	0.239
Jiangsu	1.86	0.236	0.127	1.43	0.132	0.092	1.17	0.094	0.080
Zhejiang	1.35	0.109	0.081	0.97	0.107	0.110	0.99	0.101	0.102
Anhui	2.05	0.136	0.066	1.82	0.116	0.064	1.38	0.121	0.088
Fujian	2.27	0.231	0.102	1.76	0.188	0.107	1.57	0.146	0.093
Jiangxi	2.32	0.151	0.065	1.89	0.114	0.060	1.20	0.137	0.114
Shandong	2.11	0.156	0.074	1.30	0.088	0.068	0.95	0.084	0.089
Henan	2.49	0.137	0.055	1.89	0.116	0.061	1.73	0.116	0.067

Table B.5. Sampling errors for the total fertility rates for China, the two subclasses, and the provinces, 1990-1992 (continued)

South									
Hubei	2.23	0.214	0.096	1.97	0.19	0.097	1.84	0.131	0.071
Hunan	2.20	0.106	0.048	1.64	0.106	0.064	1.25	0.084	0.068
Guangdong	2.08	0.131	0.063	1.91	0.132	0.069	1.98	0.133	0.067
Guangxi	1.88	0.176	0.094	1.55	0.138	0.089	1.88	0.167	0.089
Hainan	3.27	0.547	0.167	3.15	0.506	0.161	3.68	0.439	0.119
Southwest									
Sichuan	1.67	0.103	0.062	1.50	0.084	0.056	1.38	0.083	0.060
Guizhou	2.38	0.239	0.130	2.07	0.250	0.121	2.24	0.163	0.073
Yunnan	2.24	0.220	0.098	2.01	0.166	0.083	2.25	0.233	0.104
Tibet	3.67	0.765	0.208	2.17	0.924	0.427	4.65	0.953	0.205
Northwest									
Shaanxi	2.22	0.175	0.079	2.08	0.191	0.092	2.37	0.198	0.084
Gansu	2.52	0.223	0.088	1.78	0.231	0.129	1.71	0.153	0.089
Qinghai	2.88	0.455	0.158	2.47	0.529	0.214	1.58	0.438	0.277
Ningxia	2.00	0.432	0.216	1.80	0.327	0.182	1.51	0.392	0.260
Xinjiang	2.80	0.445	0.159	2.41	0.212	0.088	2.48	0.323	0.130

Table B.6. Sampling errors and related statistics for children ever born, 1992

Class	age group	CEB	SE	n	Deft	Roh	SE/r	r-2 SE	r +2
China									
	15-19	0.018	0.002	18,116	1.21	0.017	0.103	0.014	0.022
	20-24	0.503	0.010	21,885	1.88	0.078	0.019	0.484	0.522
	25-29	1.473	0.019	20,779	2.91	0.244	0.013	1.436	1.510
	30-34	1.922	0.028	12,137	3.12	0.501	0.015	1.865	1.978
	35-39	2.271	0.029	14,301	3.11	0.418	0.013	2.212	2.330
	40-44	2.882	0.028	11,542	2.41	0.290	0.010	2.825	2.939
	45-49	3.567	0.035	8,208	1.93	0.238	0.010	3.498	3.636
Agriculture									
	15-19	0.022	0.002	14,854	1.16	0.016	0.101	0.017	0.026
	20-24	0.560	0.010	17,889	1.65	0.066	0.017	0.541	0.579
	25-29	1.610	0.018	16,452	2.44	0.206	0.011	1.574	1.646
	30-34	2.175	0.026	9,083	2.48	0.404	0.012	2.124	2.227
	35-39	2.518	0.027	11,113	2.56	0.350	0.011	2.464	2.572
	40-44	3.116	0.028	9,235	2.16	0.281	0.009	3.061	3.172
	45-49	3.802	0.033	6,552	1.68	0.202	0.009	3.735	3.868
Non-agriculture									
	15-19	0.002	0.000	3,262	0.00	_	0.000	0.002	0.002
	20-24	0.244	0.014	3,996	1.86	0.484	0.059	0.216	0.273
	25-29	0.942	0.022	4,327	2.54	0.982	0.023	0.898	0.986
	30-34	1.160	0.028	3,054	2.80	_	0.024	1.103	1.216
	35-39	1.397	0.037	3,188	2.90	_	0.027	1.322	1.472
	40-44	1.927	0.044	2,307	2.28	_	0.023	1.839	2.014
	45-49	2.619	0.058	1,656	1.85	_	0.022	2.503	2.735

Table B.7. Sampling errors and related statistics for children surviving, 1992

Class	age group	CEB	SE	n	Deft	Roh	SE/r
China							
	15-19	0.018	0.002	18116	1.19	0.016	0.103
	20-24	0.488	0.009	21885	1.85	0.075	0.019
	25-29	1.430	0.018	20779	2.91	0.244	0.012
	30-34	1.866	0.027	12137	3.16	0.515	0.014
	35-39	2.181	0.028	14301	3.20	0.446	0.013
	40-44	2.736	0.026	11542	2.44	0.299	0.010
	45-49	3.320	0.030	8208	1.91	0.229	0.009
Agriculture							
	15-19	0.021	0.002	14854	1.14	0.014	0.101
	20-24	0.542	0.009	17889	1.63	0.063	0.017
	25-29	1.559	0.017	16452	2.46	0.21	0.011
	30-34	2.107	0.024	9083	2.52	0.416	0.012
	35-39	2.410	0.025	11113	2.65	0.378	0.011
	40-44	2.946	0.026	9235	2.19	0.292	0.009
	45-49	3.516	0.029	6552	1.66	0.196	0.008
Non-agriculture							
	15-19	0.002	0.000	3262	0.00	_	0.000
	20-24	0.241	0.014	3996	1.86	0.481	0.059
	25-29	0.930	0.022	4327	2.56	0.994	0.023
	30-34	1.143	0.027	3054	2.80	_	0.024
	35-39	1.369	0.036	3188	2.91	_	0.026
	40-44	1.881	0.041	2307	2.25	_	0.022
	45-49	2.532	0.053	1656	1.80	_	0.021

Table B.8. Sampling errors and related statistics for birth order proportions, 1990-1992

Class and year		Birth order	Proportion (%)	SE	n	Deft	Roh	SE/r
China								
	1990	first	50.4	0.952	7,524	1.65	0.166	0.019
		second	33.1	0.711	7,524	1.31	0.069	0.022
		third and higher	16.6	0.668	7,524	1.56	0.137	0.040
	1991	first	58.9	0.931	6,451	1.52	0.149	0.016
		second	28.5	0.689	6,451	1.23	0.057	0.024
		third and higher	12.6	0.647	6,451	1.57	0.166	0.052
	1992	first	61.5	1.073	3,730	1.35	****	0.017
		second	28.7	0.840	3,730	1.13	****	0.029
		third and higher	9.81	0.645	3,730	1.32	****	0.066
Agriculture								
	1990	first	46.3	0.889	6,614	1.45	0.122	0.019
		second	35.4	0.708	6,614	1.20	0.05	0.020
		third and higher	18.3	0.709	6,614	1.49	0.135	0.039
	1991	first	55.1	0.906	5,589	1.36	0.114	0.016
		second	30.9	0.701	5,589	1.13	0.038	0.023
		third and higher	14.0	0.707	5,589	1.52	0.175	0.050
	1992	first	56.9	1.094	3,135	1.24	****	0.019
		second	31.7	0.877	3,135	1.06	****	0.028
		third and higher	11.3	0.733	3,135	1.30	****	0.065
Non-agriculture								
	1990	first	81	2.206	910	1.69	****	0.027
		second	15.65	1.766	910	1.47	****	0.113
		third and higher	3.7	0.916	910	1.47	****	0.250
	1991	first	84.40	2.041	862	1.65	****	0.024
		second	12.70	1.639	862	1.44	****	0.129
		third and higher	2.9	0.774	862	1.36	****	0.269
	1992	first	85.8	1.954	595	1.36	****	0.023
		second	12.5	1.854	595	1.37	****	0.148
		third and higher	1.7	0.57	595	1.07	****	0.329

Table B.9. Sampling errors and related statistics for mean age at first marriage, 1990-1992

Class and year		Sex*	MAFM	SE	n	Deft	Roh	SE/r
China								
	1990	male	23.46	0.088	3,921	1.40	_	0.004
		female	21.67	0.062	4,209	1.50	0.229	0.003
	1991	male	23.45	0.082	3,260	1.31	_	0.003
		female	21.87	0.056	3,709	1.32	_	0.003
	1992	male	24.19	0.106	2,032	1.15		0.004
		female	22.44	0.066	2,441	1.21	_	0.003
Agriculture								
	1990	male	23.02	0.082	3,129	1.17	_	0.004
		female	21.31	0.056	3,409	1.29	_	0.003
	1991	male	22.98	0.079	2,530	1.16		0.003
		female	21.52	0.055	2,941	1.22	_	0.003
	1992	male	23.78	0.117	1,578	1.11		0.005
		female	22.13	0.073	1,890	1.19	_	0.003
Non-agriculture								
	1990	male	25.24	0.203	792	1.58	_	0.008
		female	23.21	0.140	800	1.41	_	0.006
	1991	male	25.14	0.174	730	1.32	_	0.007
		female	23.22	0.105	768	1.14	_	0.005
	1992	male	25.65	0.216	454	1.25	_	0.008
		female	23.55	0.127	551	1.18	_	0.005

Table B.10. Sampling errors and related statistics for proportions of contraceptive use, 1992

Class and Method*		Proportion (%)	SE	n	Deft	Roh	SE/r
China							
	Long effect	84.9	0.375	72,531	2.82	0.064	0.004
	Short effect	5	0.269	72,531	3.22	0.086	0.050
Agriculture							
	Long effect	86.4	0.359	58,229	2.53	0.062	0.004
	Short effect	3.6	0.219	58,229	2.83	0.080	0.061
Non-agriculture							
	Long effect	78.4	0.938	14,302	2.73	0.310	0.012
	Short effect	12.7	0.732	14,302	2.63	0.286	0.058

*Long-term effect: includes vasectomy, tubal ligation and the IUD.
*Short-term effect: other reversible methods.

Table B.11. Sampling Errors and related statistics for mortality rates, 1992

Class and measure	Sex	Death rate	SE	n	Deft	Roh	SE/r
China							
Crude death rate*	total	6.0	0.16	8,5271	1.09	0.000	0.027
Infant mortality rate**	total	38.4	2.95	10,349	1.00	0.000	0.077
	males	39.9	4.14	5,530	1.02	0.004	0.104
	females	36.6	4.23	4,819	0.99	-0.003	0.116
Agriculture							
Crude death rate*	total	6.4	0.18	13,118	1.08	0.000	0.028
Infant mortality rate**	total	41.0	3.26	8,878	0.99	-0.002	0.079
	males	41.3	4.39	4,764	0.99	-0.004	0.106
	females	40.7	4.82	4,114	0.98	-0.006	0.118
Non-agriculture							
Crude death rate*	total	4.3	0.32	72,153	1.13	0.003	0.074
Infant mortality rate**	total	23.1	6.44	1,471	1.03	_	0.279
	males	31.9	10.80	766	1.05	_	0.339
	females	13.1	6.54	705	1.01	_	0.500

*per 1000 population
**per 1000 live births

Table B.12 Design factors and rate of homogeneity by variable and region

	CBR		GFR		ASFR		BOR1		BOR2		BOR3	
Region	**deft**	**roh**	**deft**	**roh**	**deft**	**roh**	**deft**	**roh**	**deft**	**roh**	**deft**	**roh**
Beijing	1.45	0.0010	1.34	0.0027	1.22	0.0102	1.59	0.1488	1.67	0.1483	0.96	-0.0026
Tianjin	1.14	0.0000	0.99	0.0003	0.97	-0.0002	1.06	0.0097	0.86	-0.0337	1.22	0.0553
Hebei	1.06	0.0007	1.06	0.0010	1.04	0.0055	1.26	0.0707	1.05	0.0096	1.53	0.1755
Shanxi	1.30	0.0017	1.99	0.0243	1.33	0.0340	1.48	0.1656	1.44	0.1492	1.43	0.1502
In. Mongol	1.33	0.0027	1.29	0.0077	1.18	0.0270	1.27	0.1220	0.84	-0.0580	1.38	0.1800
Liaoning	1.27	0.0013	1.29	0.0043	0.96	-0.0023	1.32	0.1145	1.28	0.0978	0.87	-0.0380
Jilin	1.34	0.0013	1.41	0.0059	1.08	0.0075	1.34	0.1017	0.91	-0.0199	1.38	0.1059
Heilongjiang	0.97	0.0000	1.16	0.0034	1.04	0.0028	1.65	0.2800	1.13	0.0460	1.45	0.1790
Shanghai	0.95	0.0000	0.92	-0.0003	1.08	0.0084	1.39	0.1068	1.39	0.1068	***	***
Jiangsu	2.01	0.0030	2.00	0.0123	1.28	0.0152	2.61	0.3755	1.89	0.1666	1.83	0.1452
Zhejiang	0.91	0.0000	1.13	0.0017	1.01	0.0006	1.07	0.0168	0.96	-0.0132	1.34	0.1154
Anhui	1.22	0.0007	1.28	0.0037	1.12	0.0068	1.31	0.0682	1.08	0.0229	1.07	0.0093
Fujian	1.31	0.0013	1.41	0.0079	1.18	0.0161	1.09	0.0197	0.76	-0.0414	1.11	0.0241
Jiangxi	0.91	-0.0005	1.14	0.0023	1.19	0.0165	1.58	0.1467	1.36	0.0838	1.11	0.0247
Shandong	1.40	0.0013	1.45	0.0049	1.13	0.0084	1.85	0.1685	1.57	0.0999	1.41	0.0663
Henan	1.32	0.0010	1.35	0.0040	1.17	0.0124	1.19	0.0286	1.08	0.0120	1.39	0.0655
Hubei	1.31	0.0007	1.71	0.0102	1.37	0.0259	1.71	0.1481	1.19	0.0422	1.62	0.1158
Hunan	1.03	0.0000	1.13	0.0013	1.08	0.0063	1.16	0.0260	1.06	0.0074	1.24	0.0386
Guangdong	1.00	0.0000	1.36	0.0040	1.17	0.0129	1.66	0.1399	1.29	0.0488	1.66	0.1380
Guangxi	1.18	0.0010	1.31	0.0053	1.03	0.0005	1.17	0.0644	0.97	-0.0113	1.48	0.1666
Hainan	1.41	0.0017	1.29	0.0053	1.01	0.0062	0.88	-0.0050	0.92	-0.0110	1.35	0.0687
Sichuan	1.22	0.0010	1.30	0.0043	1.16	0.0134	1.46	0.1370	1.34	0.0963	1.42	0.1309
Guizhou	1.33	0.0013	1.45	0.0089	1.29	0.0291	1.00	0.0044	0.97	-0.0031	1.22	0.0546
Yunnan	1.16	0.0010	1.50	0.0130	1.14	0.0245	1.49	0.1874	1.21	0.0726	1.80	0.3499
Tibet	1.07	0.0020	1.08	0.0070	0.85	-0.0387	***	***	***	***	***	***
Shaanxi	1.27	0.0013	1.32	0.0067	1.16	0.0181	1.40	0.1307	1.01	-0.0015	1.33	0.0987
Gansu	0.93	0.0000	1.39	0.0090	1.30	0.0331	1.96	0.3037	1.50	0.1313	1.40	0.0996
Qinghai	0.93	-0.0005	1.24	0.0114	1.20	0.0629	***	***	***	***	***	***
Ningxia	1.08	0.0010	1.13	0.0046	1.04	0.0179	***	***	***	***	***	***
Xinjiang	1.12	0.0013	1.41	0.0178	1.20	0.0465	***	***	***	***	***	***
Mean	1.29	0.0013	1.44	0.0066	1.23	0.0192	1.59	0.1582	1.27	0.0635	1.56	0.1504
table B.12 deff	1.69		2.09		1.40		2.05					
	1.30	0.0000	1.4457	0.0000	1.1832	0.0000	1.43	0.0000	0.00	0.0000	0.00	0.0000
	CBR		GFR		ASFR		BOR1		BOR2		BOR3	
max	2.0060	0.0030	1.9979	0.0243	1.3666	0.0629	2.61	0.3755	1.89	0.1666	1.83	0.3499
min	0.9105	-0.0005	0.9243	-0.0003	0.8460	-0.0387	0.88	-0.0050	0.76	-0.0580	0.87	-0.0380
mean	1.1982	0.0009	1.3278	0.0065	1.1323	0.0142	1.42	0.1185	1.18	0.0442	1.36	0.1007

Table B.12 Design factors and rate of homogeneity by variable and region (*continued*)

Region	CDR		IMR		AFM		CUMS		CUML	
	deft	roh	deft	roh	deft	roh	deft	roh	deft	roh
Beijing	1.05	0.0000	0.83	-0.0290	1.52	0.1592	2.21	0.0170	1.96	0.0120
Tianjin	1.07	0.0000	0.94	-0.0174	1.43	0.1611	4.84	0.1500	4.26	0.1140
Hebei	1.18	0.0010	0.94	-0.0154	* * *	* * *	2.10	0.0380	2.38	0.0520
Shanxi	1.14	0.0010	0.91	-0.0209	* * *	* * *	3.32	0.1350	* * *	* * *
In. Mongol	1.05	0.0000	1.06	0.0170	* * *	* * *	2.13	0.0580	1.85	0.0400
Liaoning	1.19	0.0010	1.08	0.0203	1.43	0.1888	2.20	0.0320	1.60	0.0130
Jilin	0.88	0.0000	0.99	-0.0022	1.18	0.0696	* * *	* * *	1.78	0.0150
Heilongjiang	0.84	-0.0010	0.86	-0.0380	* * *	* * *	2.35	0.0580	1.96	0.0360
Shanghai	0.89	0.0000	* * *	* * *	1.90	0.3687	1.70	0.0090	1.97	0.0130
Jiangsu	1.18	0.0000	1.08	0.0116	1.36	0.0848	3.60	0.0560	2.71	0.0300
Zhejiang	0.78	-0.0010	0.90	-0.0271	1.23	0.1030	2.32	0.0340	2.12	0.0270
Anhui	1.06	0.0000	0.97	-0.0044	1.38	0.1488	4.16	0.1290	3.68	0.0990
Fujian	0.96	0.0000	0.93	-0.0104	* * *	* * *	3.42	0.1120	2.12	0.0360
Jiangxi	0.98	0.0000	1.08	0.0188	1.63	0.3140	2.69	0.0670	1.93	0.0290
Shandong	1.12	0.0000	0.95	-0.0101	1.14	0.0499	2.97	0.0470	2.30	0.0260
Henan	0.98	0.0000	1.01	0.0023	0.84	-0.0510	1.70	0.0140	1.71	0.0140
Hubei	0.85	0.0000	0.91	-0.0101	1.96	0.4292	4.58	0.1350	3.30	0.0670
Hunan	1.16	0.0000	1.16	0.0318	1.12	0.0421	2.33	0.0310	1.66	0.0120
Guangdong	1.35	0.0010	0.99	-0.0035	1.29	0.0937	2.87	0.0530	1.98	0.0210
Guangxi	1.09	0.0000	0.90	-0.0217	* * *	* * *	2.50	0.0540	2.61	0.0600
Hainan	0.39	-0.0010	0.95	-0.0056	* * *	* * *	0.77	-0.0040	2.35	0.0450
Sichuan	1.13	0.0000	0.96	-0.0069	1.37	0.1427	3.61	0.1030	3.63	0.1040
Guizhou	1.06	0.0000	1.00	-0.0018	1.38	0.1790	1.24	0.0050	1.52	0.0130
Yunnan	1.27	0.0020	1.02	0.0017	* * *	* * *	2.71	0.0950	* * *	* * *
Tibet	0.80	-0.0030	* * *	* * *	* * *	* * *	* * *	* * *	2.18	0.2150
Shaanxi	0.95	0.0000	1.07	0.0259	* * *	* * *	1.30	0.0080	2.10	0.0410
Gansu	1.52	0.0030	1.07	0.0207	* * *	* * *	* * *	* * *	2.35	0.0540
Qinghai	1.26	0.0030	1.05	0.0190	* * *	* * *	* * *	* * *	* * *	* * *
Ningxia	1.05	0.0000	* * *	* * *	* * *	* * *	* * *	* * *	3.43	0.2310
Xinjiang	0.98	0.0000	0.97	-0.0070	* * *	* * *	2.43	0.1290	3.16	0.2350
Mean	1.09	0.0000	1.01	0.0033	1.50	0.2290	3.22	0.0860	2.82	0.0640
table B.12 deff	1.20		1.00		1.80		9.10			
	1.10	0.0000	1.00	0.0000	1.34	0.0000	3.02			
	CDR		IMR		AFM		CUMS		CUML	
max	1.52	0.0030	1.16	0.0318	1.96	0.4292	4.84	0.1500	4.26	0.2350
min	0.39	-0.0030	0.83	-0.0380	0.84	-0.0510	0.77	-0.0040	1.52	0.0120
mean	1.04	0.0002	0.98	-0.0023	1.39	0.1552	2.64	0.0626	2.39	0.0613