FERTILITY CHANGE AND THE IMPACT OF FAMILY PLANNING IN SHAANXI PROVINCE, CHINA

by

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DECLARATION

Except where otherwise indicated

this thesis is my own work.

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ABSTRACT

This study analyzes the fertility change in Shaanxi Province, China and estimates the impact of family planning programs on fertility decline during the 1972-1984. Data used come from the 1985 Regional In-Depth Fertility Survey, supplemented by service statistics of family planning.

Fertility change in Shaanxi is analyzed in terms of children ever born to married women, parity progression ratio, age-specific fertility rates, age-specific marital fertility rates and total fertility rates, as well as cohort-period fertility rates. The results confirm a substantial fertility decline in the study areas, particularly among women aged 30 and over and during the 9 years prior to the 1985 survey. This study reveals very high levels of knowledge (5.2 methods per women) and use (currently 69 percent) of contraceptives, suggesting that contraceptive practice plays a key role in reducing fertility among married women in Shaanxi. Of all methods used, 92.6 percent are provided by family planning programs, mainly the more efficient methods, the IUD and sterilization. The study also finds that under strong family planning programs, contraceptive use among married women is irrespective of educational level,

Three evaluative methods have been employed to assess the program impact on fertility decline: standardization approach, component projection approach II, and the prevalence model. It is estimated that, of all births averted during the period 1972-1984, three-quarters had been averted by women aged 25-39 at the time of the survey, and about 80 percent had been averted by using the IUD and sterilization.

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Chapter 1: INTRODUCTION AND BACKGROUND

During the last two decades, national family planning programs have been gradually adopted by governments of most developing countries. Their purpose, among others, is to reduce, through direct government intervention, the high rates of population growth that hinder socioeconomic development. China's family planning program is always cited as the most successful among the large but less developed countries. A number of policies appear to have contributed to this success: 1) strong commitment by national and local governments; 2) effective social and political organizations and extensive community involvement; 3) political and economic incentives and disincentives; 4) continuing information, education and motivation campaigns; and 5) wide availability of a variety of fertility control methods (Chen and Kols, 1982). Although not all of these strategies are readily applicable to other developing countries, a positive example has been set by the Chinese model in reducing fertility within a short period.

Because of its important policy implications, a reliable assessment of the performance of China's family planning program, in both qualitative and quantitative terms, has become a major concern of demographers and policy-makers. This assessment has not been made before for political and technical reasons. On one hand, population studies and demographic research as an academic discipline have been neglected for almost 20 years in China since the "New Population Theory" proposed by Professor Ma Yinchu was criticized in 1957. On the other hand, demographic data, if available at all, were not always of satisfactory quality for sophisticated analysis. Unlike some other developing countries, China is thought to maintain an effective system of vital registration. The problem is that the data collected remain in most instances unpublished.

Table 1.1: POPULATION TOTALS AND VITAL RATES, CHINA, 1949-1985

YEAR	POPULATION (million)	BIRTH RATE (/1000)	DEATH RATE (/1000)	GROWTH RATE (/1000)
1949	541.67	36.0	20.0	16.0
1950	551.96	37.0	18.0	19.0
1951	563.00	37.8	17.8	20.0
1952	574.82	37.0	17.0	20.0
1953	587.96	37.0	14.0	23.0
1954	602.66	37.9	13.2	24.8
1955	614.65	32.6	12.3	20.3
1956	628.28	31.9	11.4	20.5
1957	646.53	34.0	10.8	23.2
1958	659.94	29.2	11.9	17.2
1959	672.07	24.8	14.6	10.2
1960	662.07	20.9	25.4	-4.6
1961	658.59	18.0	14.2	3.8
1962	672.95	37.0	10.0	27.0
1963	691.72	43.4	10.0	33.3
1964	704.99	39.1	11.5	27.6
1965	725.38	37.9	9.5	28.4
1966	745.42	35.1	8.8	26.2
1967	763.68	33.9	8.4	25.5
1968	785.34	35.6	8.2	27.4
1969	806.71	34.1	8.0	26.1
1970	829.92	33.4	7.6	25.8
1971	852.29	30.7	7.3	23.3
1972	871.77	29.8	7.6	22.2
1973	892.11	27.9	7.0	20.9
1974	908.59	24.8	7.3	17.5
1975	924.20	23.0	7.3	15.7
1976	937.17	19.9	7.2	12.7
1977	949.74	18.9	6.9	12.1
1978	962.59	18.3	6.3	12.0
1979	975.42	17.8	6.2	11.6
1980	987.05	18.2	6.3	11.9
1981	1,000.72	20.9	6.4	14.5
1982	1,015.41	21.1	6.6	14.5
1983	1,024.95	18.6	7.1	11.5
1984	1,034.75	17.5	6.7	10.8
1985	1,045.32	17.8	6.6	11.2

Source: Chinese State Bureau of Statistics, 1986.

high in old China, around 30 to 35 per thousand on average, the natural growth of the population always remained at a low level. From 1840 to 1949 China's population is estimated to have increased from 410 million to 540 million with an average annual growth rate of only 0.26 per cent (Yang, 1981).

Since 1949, an accelerated demographic transition has taken place in China following tremendous social and economic changes. Table 1.1 shows the vital rates in China from 1949 to 1985. In the early 1950s the birth rate was still high, as the result of a baby-boom after the Civil War. It dropped gradually in the following years, reaching its lowest point of 18 per thousand in 1961 because of widespread famine and the economic disruption caused by the Great Leap Forward. The birth rate recovered very quickly and, with the second baby-boom in 1963, reached another peak of 43.4 per thousand. Apart from the two baby-booms, the higher fertility was also attributed to stable economic conditions, reduced widowhood in the reproductive years, and higher fecundity based on improved health (Banister,1984). The birth rate then fell gradually till the Cultural Revolution began in 1966. The 1970s witnessed a rapid decline in birth rate after family planning programs were reinforced as official policy in 1971. In the 10 years from 1971 to 1980 the birth rate fell by 40 per cent from 30.7 per thousand to 18.2 per thousand.

The death rate, on the other hand, has fallen steadily since 1949 from over 15 per thousand in the early 1950s to 6-7 per thousand in the early 1980s, except for the peak rate of 25.4 per thousand in 1960 caused by the famine mentioned above. The difference between birth rates and death rates, natural increase rates, also dropped substantially after the mid-1960s. Consequently, a new pattern of population growth has emerged with a moderate birth rate, low death rate and a moderate rate of natural increase. Considering the fact that half of China's population are under 21, it is likely that the moderate rate of natural increase will remain for the rest of this

century, before it reaches zero or even negative values later on.

1.2. An Overview of Family Planning Programs in China

The family planning program in China is one of the oldest and strongest in the world (Chen and Kols, 1982). Since the first government effort to pursue birth control in the early 1950s, the family planning program in China has been enriched, improved and developed. Four rounds of campaign have been launched: 1) the First Campaign from 1953 to 1958; 2) the Second Campaign from 1962 to 1966; 3) the Wan Xi Shao (Later, Longer, Fewer) Campaign from 1971 to 1979; and 4) the One-Child Campaign from 1979 to the present.

1.2.1. The First Campaign (1953 - 1958)

The first government effort at birth control was introduced in 1953, as a response to the First National Census conducted in the same year. After three years of rehabilitation since the founding of the People's Republic in 1949 after the Civil War, the Government faced the enormous task of transforming China into a new nation. Accurate population figures were urgently needed for economic planning, election registration, grain distribution and for other administrative purposes. Until then, China's population was officially estimated at about 450 million. However, according to the 1953 national census, the actual figure turned out to be 602 million, 150 million more than estimated (Liu et al.,1983). The Government began to be aware of the problem of rapid population growth.

In August 1953 the State Council approved the regulations drafted by the Ministry of Public Health concerning contraception and legalized abortion. In December 1954, a symposium on birth control was held and, as a result, a high-level group was set up to study birth control. In 1956 a directive concerning contraception was issued by the Ministry of Public Health, ordering the education and dissemination of birth control information

throughout China (Population Institute, CASS, 1987). Meanwhile, hot debate about population and birth control was opened in academic circles. Professor Ma Yinchu published his famous work, "The New Population Theory", suggesting that population control and priority for light industry would be the best way of capital accumulation for economic development (Ma Yinchu, 1979).

The Ministry of Public Health held the responsibility for implementing the program through subordinate medical networks. Arrangements were made for the full-scale training of personnel and for the manufacture and distribution of contraceptives. The methods of contraception commonly used were the condom, the diaphragm, and a variety of spermicidal jellies, creams and powders. National figures showed that between 1955 and 1956 sales of diaphragms increased 100 per cent, suppositories 300 per cent and condoms 400 per cent (Aird,1972). In March 1956, the Ministry of Public Health revised the regulations on abortion and sterilization, making them easier to obtain.

No assessment of the overall effect of the first birth control campaign has been made at the national level. However, some local reports from both urban and rural areas indicated that the birth rate did fall to some extent, particularly in the period from 1954 to 1956 (Aird,1972). Unfortunately, this campaign came to an end in 1958 when the Great Leap Forward was introduced and finally brought China's economy to disruption. Ironically, the birth rate dropped drastically during this period (1959-1961), not because of family planning programs, but rather because of famine.

1.2.2. The Second Campaign (1962 - 1966)

As China's economy began to recover from the famine and the economic disruption caused by the Great Leap Forward, a second family planning campaign started. In 1964 the Second National Census was conducted. The census results revealed that the total population in 1964 was 723 million, 114 million more than enumerated in the 1953 census. Having

drawn lessons from the food shortage in famine years, the government played an even greater role in initiating the birth control campaign. The State Council issued the Directive on Encouraging Birth Planning in 1962 and the Decision on Establishment of Family Planning Commissions in Central and Local Governments in 1963 (Population Institute, CASS, 1987). In the same year the Ministry of Public Health organized a national symposium on birth planning. At the symposium, measures to promote contraceptive use and late marriage were adopted and a target was set to reduce population growth from 2 per cent to 1-1.5 per cent in 10 years (Kaufman,1983).

The program itself was improved in different respects. Mass media were employed extensively for education and dissemination of ideas, such as small family and birth limitation, with special emphasis on women and youth. Meanwhile, the public health network was expanded tremendously, particularly in rural areas, as a result of the "To-the-Countryside" movement in the early 1960s. Compared with the 1950s, medical workers were better trained and better equipped for performing contraceptive operations. As far as the methods of birth control are concerned, the introduction of the intra-uterine device (IUD) and foot-pump-operated vacuum-suction method for abortion contributed greatly to the success of family planning. By the end of 1965 it was estimated that 14-15 million (10-11 per cent) women in childbearing ages were using contraception (Kaufman, 1983).

Like the first birth planning campaign in the 1950s, the second was also disrupted by political turmoil: the Cultural Revolution in 1966. Government organizations were paralyzed , production ceased, and contraceptive supplies were cut off. As a result, birth rates increased. In the five years from 1966 to 1971 the total population increased by 122 million, or an average annual increase of over 22 million (Yang,1981).

1.2.3. The "Wan, Xi, Shao" (Later, Longer, Fewer) Campaign (1971 - 1979)

In 1971, when order was restored in most parts of China with the help of the military, a third birth planning campaign was launched. In a State Council Directive the new policy was announced as the follows:

> Birth planning is an important matter that Chairman Mao has advocated for many years, and demands serious attention by the leading comrades at various levels. Except for the thinly populated national minority areas and others, the leading comrades at each level must strengthen leadership, conducting penetrating propaganda and education, so that late marriage and birth planning become voluntary behaviour on the part of broad masses in cities and rural villages, and strive hard to accomplish outstanding results during the Fourth Five-Year Plan period 1971-1975 (Chen and Kols, 1982:J-581).

In 1973 targets for population growth were for the first time embodied in national development plans. In the same year the State Council set up the Family Planning Group to restore the functions of the former Family Planning Staff Office. Family planning committees were established at almost all levels of government and in almost all organizations of society, such as factories, communes and service institutions. These committees were in charge of most of the educational and organizational work of family planning. Special policies, such as free delivery of contraceptives and paid leave for those who underwent sterilization, were adopted by local governments to match the massive propaganda work.

The third birth control campaign made special efforts to popularize the three reproductive goals of "Wan, Xi, Shao" (Later Marriage, Longer Spacing, and Fewer Children) put forward at the 1973 Working Conference of Family Planning. The recommended later age at marriage was 25 for males and 23 for females in rural areas, and 28 for males and 25 for females in urban areas. "Longer spacing" was interpreted as at least 4 years between the first and the subsequent birth. "Fewer children" was defined as two children for each couple (Bongaarts and Greenhalgh,1985).

Apart from the improved health networks, barefoot doctors, which were brought into use on a large scale in the early 1970s, played an important part in carrying out family planning programs in rural areas. Barefoot doctors were part-time health workers in villages who had undergone some basic medical training. They were in charge of maintaining the good health of the villagers and providing first aid in case of emergency. Birth control was one of the primary functions of the barefoot doctors. They organized local mass meetings and paid home visits to educate and persuade couples to practice contraception, to distribute contraceptives and to keep accurate records of contraceptive use. In addition to other conventional methods, a variety of oral contraceptives became available during this period. The convenience, effectiveness, and wide availability of the pill greatly increased the efficiency of birth control efforts.

The third birth control campaign achieved great success. Contraceptive use rose spectacularly and the prevalence rate was as high as that in developed low-fertility countries (Chen,1985). According to incomplete regional data of 1978, contraceptive prevalence rates were over 80 per cent in the two cities of Shanghai and Tianjin, and in the four provinces of Gansu, Hebei, Jiangsu and Shaanxi (Chen and Kols, 1982). The birth rate at national level dropped from 30.7 per thousand in 1971 to 18.3 per thousand in 1978 (see Table 1.1). The rate of natural increase also fell, although not as fast as the birth rate, because of the neutralizing effect of the falling death rate.

1.2.4. The "One-Child" Campaign (1979 - the Present)

The Cultural Revolution came to an end in 1976 with the death of Mao and the subsequent arrest of the "Gang of Four". The new leadership was even more strongly committed to developing the economy and controlling population growth. Top priority was given to the "Four Modernizations" of agriculture, industry, defence, and science and technology.

The target was stated as achieving a per capita gross national product (GNP) of U.S.$ 800 by the year 2000. It was argued that modernization efforts in employment, capital accumulation, living standards and education would be hampered by rapid population growth. Apart from these macroeconomic rationales, the government also realized from a number of population projections made by Chinese demographers in the period 1978-1979 that, given the young age structure of the population, the momentum of growth could not be stopped even if couples had only two children. Consequently, the One-Child Policy was adopted in early 1979, and started the fourth birth planning campaign. In his speech to the Fifth National Congress in 1980, Hua Guofeng, the Party Chairman at the time, announced:

> Upon careful study, the State Council deems it necessary to launch a crash program for 20 to 30 years calling on each couple of the dominant Han nationality to have only one child, so that the rate of population growth may be brought under control as soon as possible. Our aim is to strive to limit the population to a maximum of 1.2 billion by the end of the century (Chen and Kols, 1982:J-582).

At various government levels new legal and administrative structures were established to guarantee the implementation of family planning programs. Both the 1978 Constitution and the 1982 Constitution declared state advocacy of birth planning, while the 1980 Marriage Law required every couple to practice birth control. A draft law on family planning was proposed at the Fifth National Congress in 1980. Although the law was not formally passed, its spirit was incorporated in local regulations. In 1978 a National Conference on Population Theory was held in Beijing to articulate the rationale for birth-control work; it was followed in 1979 by The National Family Planning Conference to review previous efforts and formulate new strategy and guidelines. The State Family Planning Commission, which was upgraded from the Leading Group of Family Planning in 1981, is responsible for making national population policy and plans. As its subordinate bodies, commissions in provincial governments are supposed to work out concrete regulations and measures in the light of national policy and local conditions.

The new requirements are to be enforced by mobilizing, educating and motivating the masses through various organizational networks and mass media. As supplementary measures, economic and administrative incentives and disincentives are also widely used. Couples who have one child and pledge to have no more are issued with one-child certificates, and are hence entitled to benefits in income, housing, health care, pension, and children's education and employment. In some places, a birth quota has been introduced to balance population plan and individual demand.

Since the late 1970s, contraceptive technology has been a fast growing field, and the Chinese are in the forefront of research. Free contraceptives are available to all married couples. In practice, IUDs and sterilization are the most favoured methods. In addition, new methods, such as monthly-injected contraceptives, a male pill and male sterilization injections, are being tested. When contraception fails, abortion is frequently used as a back-up measure.

The One-Child Campaign has progressed fairly well as measured by the rate of first births and the number of newly created One-Child Certificates. In 1970 the first parity births accounted for only about 20 per cent of total births. This figure rose to 33 per cent in 1977, and then, to 47 per cent in 1981. According to 1985 statistics, 67.7 per cent of all births were first births. (The greater influx of young married couples into the reproductive population in the early 1980s, caused by the earlier birth bulge and by younger age of marriage following the new Marriage Law, would also affect the proportion of first births.) In 1985, 18.4 per cent of married couples of childbearing age had pledged to have only one child. A total of 29.45 million certificates had been issued (China Population Information Centre, 1986). On the other hand, the number of couples preventing third or higher parity may be even greater than the number who agree to have only one child. According to the 1982 National Fertility Survey, 70 per cent of the 170

million married women of reproductive age were practicing birth control (Qiu et al.,1984).

Although the one-child policy still remains the official policy at present, it has become more lenient and flexible since 1984; that is, more couples are allowed to have two children. Family planning authorities have started to pay more attention to existing social and cultural factors in the society. Local family planning workers have also gained more autonomy and independence in interpreting and executing policies. However, in the long run, China's population policy will remain very restrictive and family planning programs will be directed toward more scientific and accountable forms. This is confirmed recently by Mr. Zhao Ziyang (1987) in his report delivered to the 13th National Congress of the Communist Party of China. Mr. Zhao pointed out that, considering the big population base of China and a likely baby-boom in coming years, "we cannot afford to slacken in the least our efforts in family planning". Otherwise, the attainment of fixed targets will be jeopardized.

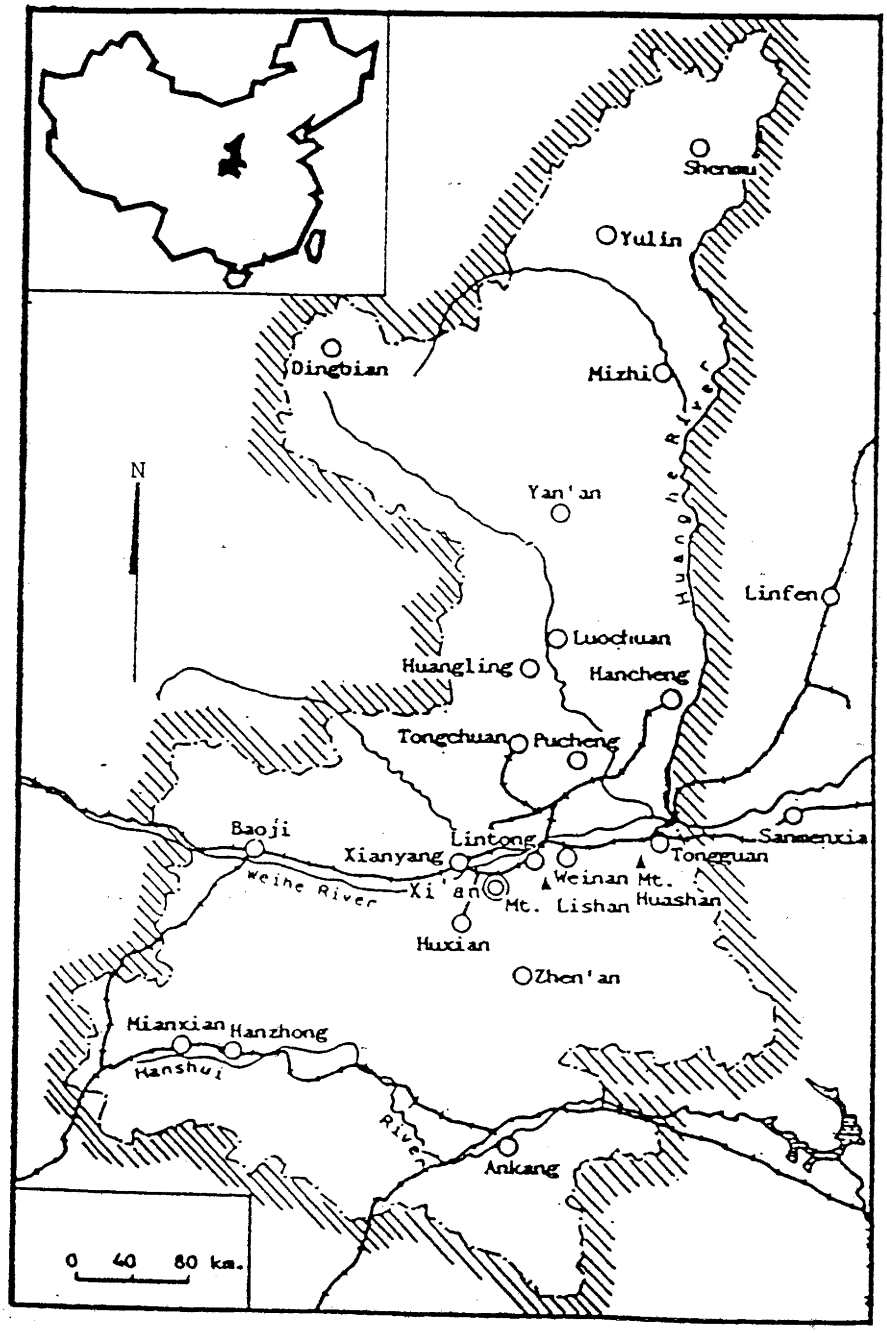
1.3 The Study Area: Shaanxi Province

1.3.1. Geographical Setting

Shaanxi Province (shown in Map 1.1), located on the upper reaches of the Yellow River, has an area of 190,000 sq.km. It is an important passage linking East China with the Northwest and Southwest.

Geographically, Shaanxi falls into three natural regions: 1) the North-Shaanxi loess plateau in the north, with relatively harsh natural conditions but rich coal reserves; 2) the Guanzhong (Central Shaanxi) basin in the centre where the provincial capital of Xi'an is situated, a notable production area for wheat and cotton; 3) the southern Qinling-Daba mountainous region in the subtropic zone, an area producing rice, tea and raw lacquer. Administratively, Shaanxi is divided into four cities, six prefectures, and eighty-nine counties.

Map 1.1: MAP OF SHAANXI PROVINCE



Source: Converted from Scherer, 1986, p. 325.

1.3.2. Socioeconomic Development

In 1949 when the new China was founded, Shaanxi's socioeconomic conditions were very poor. The economy was basically agricultural. The output value of agriculture accounted for 81.2 per cent of the total of 1.48 billion yuan from industry and agriculture. In the last few decades, Shaanxi's economy has made great progress. The conditions of agricultural production have improved greatly, farming methods have undergone enormous changes and levels of production have risen considerably. Shaanxi's coal, power, engineering, electronic, textile and light industries play a particularly important role in the national economy. In 1985 the total output value of industry and agriculture rose to 25.59 billion yuan, or more than 18 times what it was in 1949 (Shaanxi Provincial Bureau of Statistics, 1986). During the same period, marked improvements in education, health, culture and science have also been recorded. For example, there were 45 institutes of higher education by the end of 1985 - 41 more than in 1949 - enrolling 82,000 full time students, or 31.7 times as many as in 1949. The number of medical workers increased from 4,100 to 106,100. Living standards have risen substantially.

1.3.3. Population and Family Planning in Shaanxi

The First National Census of 1953 gave the total population in Shaanxi province as 16.15 million. The figure increased to 21 million in the second census of 1964, and further to 29.04 million in the third census of 1982. In twenty-nine years there was a net population increase of 12.89 million, with an average annual rate of natural increase of 2.02 per cent. According to official statistics, the total population in 1985 stood at 30.02 million, with 82.01 per cent rural population. Ethnically, the population in Shaanxi is almost homogeneous, with 99.55 per cent identified as Han Chinese in 1982.

Family planning in Shaanxi more or less follows the national pattern described above. The Provincial Family

Planning Commission was established in 1979 as a body directly subordinate to the Provincial Government. Family planning commissions at three government levels (provincial, prefectural/municipal, and county) are responsible for devising regulations that accord with national policy but also conform to local social, economic, political, and cultural conditions. A three-tier family planning network (county, township and village) is in charge of local policy implementation. In each township government there are one or two full-time family planning workers (the specialized cadres in family planning), while in each village there are one or two part-time family planning workers (the family planning propagandists). The routine tasks of village workers, most of whom are married women, include popularizing the family planning policy, distributing contraceptives, and monitoring and recording fertility and contraceptive use of fellow-villagers. In addition, a special service centre for family planning (the Propaganda and Guidance Service of Family Planning) has been set up in each county to provide information, advice, and technical assistance. In order to mobilize the efforts of the whole society, family planning associations have been gradually formed since 1984 at provincial and prefectural/municipal level, which consist of representatives from other mass organizations, such as trade unions, women's federations, and youth leagues. In 1982 demographers and experts from other academic disciplines formed the Society of Population Studies in Xi'an.

The state policy of "limiting population quantity and improving population quality" (Chen Muhua, 1986) is the guideline for forming local fertility policies. According to the current provincial regulations on birth planning, the Government advocates late marriage, late childbearing, and each couple having only one child. Second-children are only permitted for couples who fall into certain categories. However, the number of couples allowed second children must be subjected to the local target of population growth. Unplanned second and higher order births are strictly prohibited. One-child families are eligible to a variety of incentives and benefits. A recent decision adopted by the

Provincial Working Conference on Family Planning in December 1986 declared that current policies will remain unchanged for at least the next 15 years.

In the last decade or so, family planning programs have achieved great success in Shaanxi Province. The once rapid population growth has finally been brought under control. The birth rate dropped from 30.36 per thousand in 1971 to 16.95 per thousand in 1986, while the annual growth rate dropped from 2.32 per cent to 1.09 per cent. Changes can also be observed in population age-structure. The number of children aged 0-9 decreased from 7.3 million in 1972 to 5.7 million in 1982. At the same time, contraceptive prevalence increased substantially. According to 1985 statistics, 82.3 per cent of all married women in childbearing ages were using contraceptives. Of all new births, 61.7 per cent were first births (China Population Information Centre, 1986).

1.4. Data Source: The 1985 Regional In-Depth Fertility Survey

1.4.1. Objectives of the Survey

The data used in this thesis come mainly from the Regional In-Depth Fertility Survey, which was conducted in April 1985 by the Chinese State Bureau of Statistics (SBS). As its first phase, the survey area included the two provinces of Hebei and Shaanxi, as well as the municipality of Shanghai. Based on China's 1982 National 1/1000 Population Fertility Survey, the survey was aimed at a thorough and comprehensive knowledge of the current level and emerging trend of fertility, and the progress of family planning programs at provincial level in China. By making full use of the experience and methodology of the World Fertility Surveys (WFS) in the 1970s, the survey provided Chinese demographers and statisticians with an opportunity to improve their capability in research on fertility and other demographic issues. Survey data and the subsequent findings would serve as rich scientific resources for policy-makers to work out effective and feasible population policies for the future.

1.4.2. Outline of the Survey Design

1.4.2.1. Survey Respondents

Survey respondents were ever-married women aged below 50. All eligible women in the selected households during the interviewing days were interviewed.

1.4.2.2. Sampling Procedure

The systematic proportionate stratified sampling (PSS) method was employed in the survey to select a multistage stratified sample, at the first primary sampling unit (PSU) stage by the State Bureau of Statistics, but from the second stage onwards by provincial bureaus of statistics. The primary survey units were divided into 3 strata: cities, counties in the plains, and counties in the hills. The 1982 census data were utilized as the sampling frame. Based on the sample design (sampling fraction = 1/1000), 28 counties and cities were selected as primary sampling units, and 464 neighbourhood groups (urban) and village groups (rural) as ultimate area units. Altogether, 4084 women from 5903 households were successfully interviewed, with a response rate of 96.1 per cent.

1.4.2.3. Questionnaires

Three questionnaires were used in the survey: a community questionnaire, a household questionnaire and an individual questionnaire. The community questionnaire consisted of information on local socioeconomic conditions. The household questionnaire consisted of 6 questions concerning basic conditions of the household.

The individual questionnaire, the most important of the three, provided information on the basic characteristics of a respondent (15 questions), her marital history (20 questions), and maternal history (67 questions). It was also the source of information on the respondent's knowledge and use of contraception (56 questions), fertility preference

(18 questions) as well as the status of her husband (13 questions). The variables were clearly defined in the questionnaires. Interviewers were required to probe and correct any inconsistency when recording the answer. Age, for example, was calculated by the solar calendar year and counted in completed years since birth. Interviewers could consult reference charts to convert the traditionally used lunar calendar year into solar calendar year. In the module of maternal history, previous and current pregnancies as well as own children and adopted children were dealt with separately. Sensitive questions, such as questions about the death of children, were asked in indirect ways.

1.4.3. Organization and Execution of the Survey

The 1985 Regional In-Depth Fertility Survey was conducted by the Chinese State Bureau of Statistics and its subordinate offices at provincial level from 1 April to 30 April 1985. A total of 439 field workers was recruited and trained by provincial statistical bureaus. The interviewers, all of whom were female and most of whom were married, were responsible for filling in questionnaire forms under the supervision of the supervisors. Personnel from the local governments and mass organizations, such as women's federations, trade unions, youth leagues, and family planning commissions, were also mobilized to assist in the field.

The coding was done directly by interviewers in the field based on the precodes of the questionnaire, except for occupation which was coded by specialized coders in county or city statistical offices. A strict quality control system was established to guarantee the survey quality. The Statistical System and Methodology Department of the State Bureau of Statistics (SBS) was responsible for the data entry and processing. The preliminary results of the survey were published in 1986 (China Population information Centre, 1986).

1.5. Objectives and Organization of the Thesis

The major purpose of this thesis is to examine the fertility change in Shaanxi Province, China, for the period 1972-1984, and assess the impact of family planning programs on fertility decline.

The thesis consists of five chapters. Chapter 1 has been devoted to introduction and background information, including an overview of family planning programs in China, and a description of the study area and the data source. Chapter 2 is a review of literature which looks into the different views of demographers regarding the causes of fertility decline in developing countries, and the role played by family planning programs. Chapter 3 examines the fertility change in the study period, in terms of children ever born (CEB), age-specific fertility rates (ASFR) and cohort-period fertility rates. Two parameters, "M" and "m", suggested by Coale and Trussell (1978) have been computed to examine the changes in marital fertility. Chapter 4 examines the performance of family planning programs in the study area, in terms of knowledge and use of contraception. Differentials in contraceptive use by education are also discussed. Chapter 5 assesses the impact of family planning programs on fertility. Given data limitations, only less sophisticated methods have been employed: standardization approach, component projection approach II, and the prevalence model. Chapter 6 summarizes the main findings of the thesis and suggests areas for further study.

Chapter 2: THE IMPACT OF FAMILY PLANNING PROGRAMS ON FERTILITY DECLINE: A REVIEW OF EMPIRICAL STUDIES

2.1. Family Planning Programs in Developing Countries

In developing countries, the term "family planning programs" refers to programs organized by government, sometimes also involving private and commercial efforts, to help couples plan the number of children they will have by providing information, supplies and services for modern methods of birth control. In addition to maternal and child health, Government initiative is based on demographic considerations. It is believed that family planning will reduce fertility rates and, hence, brake the rapid population growth which has outstripped economic and social development. Meanwhile, program efforts are also directed at improvement of maternal and child health. A family planning program at national level was first adopted in India in 1952. By the 1980s, 117 of the 152 developing countries and regions, including 37 of the 39 countries with populations over 10 million, had introduced such programs (Watson, 1982). Correspondingly, a large number of personnel have been trained and networks have been set up to carry out these programs.

2.2. Debate on the Causes of Fertility Decline

Since the 1960s, fertility decline has been observed in many developing countries. What are the contributory factors to this decline? This is a topic that attracts interest not only from demographers, but from government policy-makers as well. Demographers differ sharply in their opinions concerning causes of fertility decline. Most observers hold that there are two groups: those who take the economic development approach and those who follow the family planning approach (Blake,1965, Freedman and Berelson,

1976; Haaga,1985). However, Cutright and Kelly (1981) identified three main groups in the early 1980s.

Demographers of the first group are advocates of the classical theory of demographic transition, which is generalized from historical experiences of European populations. According to this theory, decline in fertility is contingent on decline in mortality, and both declines are further contingent on changes in social and economic conditions. Instead of family planning programs, it is the social changes in areas such as health, education and the status of women that have changed the motivation of women for having more children, and consequently lowered the fertility level. Couples are unwilling to reduce their fertility until they can be sure that a certain number of their children will survive. Once the motive is present, couples can always find ways to control their fertility, regardless of whether there is a family planning program or not. Policy should be directed at accelerating overall social and economic development which, in turn, will create demand for fertility control. The role of family planning programs has been denied, since the programs are considered as supply-oriented and unable to cover all aspects of a population policy. Therefore, this group suggests that the government resources invested in family planning programs be transferred to other sectors which will eventually change people's desires about family size (Blake,1965; Davis,1967, 1984).

Demographers of the second group differ in regard to family planning programs. They recognize the role of family planning programs in accelerating fertility decline through easy availability of and access to the means of birth control, but argue that these programs may only succeed under favorable socioeconomic conditions. Program effects are limited in countries where economic development has not yet started or is at a very early stage, and where the institutionalized large family is still functioning. Family planning programs are successful only in curtailing the "unwanted births", but not in bringing family size into line with modern levels of mortality. In contrast, socioeconomic

development not only motivates people to limit their fertility, but also provides the infrastructure necessary to implement a family planning program. Therefore, development efforts should take precedence over family planning programs (Weeks,1978; Demeny,1975,1979; Tabah,1980; Whitney,1976).

Demographers of the third group emphasize the independent and primary effect of family planning programs on fertility decline, although not denying the importance of socioeconomic development. They hold that the European experience is not necessarily a firm guide as to the potential efficacy of organized family planning programs in modern developing countries. Empirical findings show that family planning programs are successful not only in meeting existing demands, but also in creating new ones through education and communication. Even in countries with a very low level of development, family planning programs may still help reduce fertility. Meanwhile, because of the more direct nature of the connection between family planning programs and fertility, such programs are more easily implemented and more cost-effective (Knodel and van de Walle,1979; Simmons, 1979; Londono and Bogue,1979; Freedman et al.,1981; Cutright and Kelly,1981).

Since the 1970s, the effect of family planning programs on fertility decline in developing countries has become increasingly evident, as a result of a large number of empirical studies based on national or cross-national data. However,the debate still continues. This literature review mainly discusses the empirical findings that support the family planning approach.

2.3. The Impact of Family Planning Programs on Fertility Decline

2.3.1. Theoretical Arguments

A number of demographers have explained the important role of family planning programs in fertility decline in developing countries from a theoretical point of view. The conventional theory of demographic transition is challenged

by Knodel and van de Walle (1979) in their review of the historical studies of European fertility. They find that fertility transition in Europe occurred under remarkably diverse socioeconomic and demographic conditions. The onset of fertility decline in an area is not always consistent with the level of development there. A high level of social and economic development may often accompany a fall in fertility, but it is not necessarily a precondition. The authors propose that a couple's motivation to limit fertility is only loosely linked to the level of development. The success of a family planning program is determined by a couple's response once the knowledge and means of birth control are available. Therefore, such programs may succeed even in countries at an early stage of development. The authors are sceptical about the recommendations to shift the emphasis away from family planning programs and toward development effort as a means of reducing fertility. According to their observation, historical records provide little assurance for the early success of such efforts.

Simmons (1979) also doubts the proposition that improvements in the human condition may have a greater impact on fertility than programs such as family planning that are aimed primarily at reducing fertility. He justifies his argument by making two points. Firstly, the indirect approach through development is often poorly supported on either theoretical or empirical grounds. There is little evidence that living standards in most developing countries can be improved by reducing the budget for family planning and devoting the resources thus saved to other programs. Moreover, it is no easier for the indirect programs to achieve a strong or cost-effective impact on fertility reduction than the direct ones. Secondly, the indirect solutions tend to simplify the relationship between means and end. In fact, reducing population growth is an appropriate means of achieving the end of economic and social development. Simmons also suggests using the number of births prevented per additional unit of expenditure to measure the relative efficiency of alternative interventions to reduce fertility. For a successful family planning

program, Simmons believes that factors such as sufficient resources, effective management and strong political support are necessary.

After reappraising controversial theories of fertility decline, Freedman (1979) finds that the effects of organized family planning programs are related to fertility decline, in addition to that of development level. But the program must be good at providing proper birth control information, methods and services. He points out that China and Indonesia may serve as examples of the independent effects of "high-pressure, high-priority" government family planning programs. He argues that the success of China's national birth control program is achieved through a network of political and social organizations which mobilize the masses of population, rather than improving the development level. Persistent and repetitive persuasion, discussions, and both peer and authority pressure have been utilized to promote the priority objective of family planning.

2.3.2. Country Studies

Numerous country studies have been conducted in recent years, with the purpose of answering the question of how much of the fertility decline in individual countries is due to family planning programs.

In their book "Urban Life in Contemporary China", Whyte and Parish (1984) conclude that the sharp rise in age at marriage, the dramatic decline in fertility, and the substantial reorganization of the urban household are not distinctive and are only a part of the world revolution in family pattern caused by industrialization, urbanization, and other forms of modernization. Their proposition is criticized by Wolf (1986) as seriously misleading. Wolf argues that the level of modernization achieved in China is far from sufficient to effect a dramatic reduction in fertility. He believes that the changes in the Chinese family are distinctive and that what is most distinctive about them is that they are largely the result of direct and forceful government intervention. The preeminent role of

government intervention becomes evident after Wolf has examined 1) the temporal trends shown by the 1982 1/1000 fertility survey data, and 2) the regional variations shown by his personal interviews conducted in seven Chinese collectives during the period 1980-1981. The author then discusses the success of China's birth control program, and attributes it to two factors: a strong central government that enjoys great prestige, and a highly organized social structure which ensures that government policy penetrates to villages.

In a study of modern contraceptive use in Indonesia, Freedman et al. (1981) analyze the social and economic factors contributing to fertility change. The data used come mainly from the Indonesian Fertility Survey (IFS) conducted in 1976. Like China, Indonesia is often cited as an example of a predominantly rural and relatively poor country with a successful national family planning program. The government program officially began in 1969. In less than 10 years, from 1971 to 1980, contraceptive prevalence among currently married women of reproductive age increased from 2 per cent to 41 per cent. The total fertility rate (TFR) dropped from 5.6 in the late 1960s to 4.6 in 1975. The multivariate analysis results reveal relatively high rates of contraceptive use across all strata of the population in terms of age, education, income, and place of residence, indicating that the program has had a significant effect. The most important finding is the high prevalence of contraceptive use among the poor, less educated and rural population. This contradicts the conventional wisdom that poor families have no interest in family limitation. Apart from strong government and community support, two other possible reasons are put forward by the authors. One is the sheer Malthusian pressure - the pressure of over-crowded population on natural resources, while the other is information and services offered by family planning programs.

In Thailand, Knodel and Debavalya (1978) have studied the remarkable changes in reproductive patterns, based on several national surveys conducted between 1969 to 1975.

Since Thailand is still at a rather early stage of development, the authors argue that it is important to identify factors other than socioeconomic development which have facilitated the onset of fertility decline. In their study, the authors find that the introduction of family planning programs corresponds closely with the timing of the fertility decline in rural areas. The modern contraceptives used by the majority of Thai women are supplied by the programs. The births averted estimated on service data account for most of the observed decline in fertility. Therefore, the authors conclude that a program that provides birth control information and services can have considerable impact on contraceptive use and fertility patterns. Meanwhile, they also note that an interaction between family planning programs and socioeconomic development, especially the expansion of mass communication and transportation, can have a positive role in promoting fertility decline.

Phillips et al. (1982) have analyzed the demographic effect of the Family Planning-Health Service Project (FPHSP) launched by the Cholera Research Laboratory (CRL) in Matlab Thana in Bangladesh since 1977. Having compared service data with three kinds of fertility measures (general fertility rate, age-specific fertility rate and total fertility rate), the authors find that program efforts can initiate fertility change, even in a poor rural population. For example, after the introduction of the FPHSP, contraceptive prevalence rose from 10 percent in October 1977 to 34 per cent by the end of 1978. The birth rate in program areas was 27 per cent lower than that in comparison areas among all women, and 50 per cent lower among women aged 35 and over. In summary, the findings indicate that a latent demand for contraceptive service exists in rural areas of Bangladesh and that fertility reduction may take place even in the absence of notable socioeconomic change.

Using survey data from 1965 to 1975 in Colombia, Londono and Bogue (1979) have examined the relationships between two population events in Colombia. One is a national family planning program introduced in 1965, and the other is a decline in fertility observed since the census of 1964. In

a poor and underdeveloped nation like Colombia, the authors believe that the fertility decline can be substantially attributed to the organized family planning program. Program efforts have reduced fertility quickly and comparatively inexpensively, even where illiteracy is high, living standards near the subsistence level, and religious and cultural factors hostile.

Sherris et al. (1985) have recently reviewed almost all literature concerning the impact of family planning programs on fertility. Country studies using different analytic methods are assembled to compare the program impact. Standardization studies in 14 countries show that fertility decline is to a significant extent due to lower marital fertility. The latter is assumed to be the consequence of widespread contraceptive use. Trend analysis reveals that fertility declined more sharply after a national family planning program was started. Estimates of births averted based on prevalence data also show that the family planning programs have had a major impact. The only exception is the result of areal regression analysis within countries, suggesting that socioeconomic factors are strongly linked to fertility decline and that program factors may have little independent impact. This is in contrast to cross-national analyses that program factors have a significant, independent effect on fertility decline. In general, however, the various methods reach a similar conclusion, namely, that family planning programs have had a significant impact on fertility.

2.3.3. Cross-National Studies

In addition to analysis of fertility changes within countries, cross-national studies have also been conducted to compare the effects of family planning programs and socioeconomic indicators on fertility in up to more than 100 countries.

An early cross-country study was compiled by the World Bank in 1974, based on 1970-1973 data from 19 developing countries (King et al.1974). The prime object of the study

is to determine the extent and direction of association between the output of family planning programs and socioeconomic and program input variables. According to the results, program indicators have a significant independent effect on contraceptive use. Service points, a major component of program input, account for 62 per cent of the total variance of program user rates. The number of service points is associated with socioeconomic variables, but the degree of dependence is not very high. The study concludes that, in general, both social change and family planning programs facilitate contraceptive use, and hence, a decline in fertility.

Multiple regression analysis is used by Ross et al.(1972) to examine fertility changes in countries in the ECAFE region. The variables represent the number of acceptors, program activities and socioeconomic characteristics. According to the findings, areas with higher acceptance rates or more program activities tend to have larger decreases in fertility. Program effects appear to equal or exceed those effects of socioeconomic change. Compared with the non-program areas of roughly equal geographic character, larger fertility declines are observed in the program areas. A comparison between the timing of program activity and the appearance of unusual fertility declines in an area also suggests that programs have been causally related to fertility change. Acceptors of the family planning methods also have lower fertility than they had experienced before.

Freedman and Berelson (1976) find that country performance is associated with both social setting and program effort, after first examining program performance in developing countries in terms of acceptors, methods, setting and effort, and effect on the birth rate, and then, discussing 14 country studies separately. Although social setting affects the quality of the program infrastructure, the program effort has a clear, substantial, and independent effect upon performance. Having reviewed briefly the criticisms of family planning programs, the authors list 13 aspects in which developing countries differ from historical

European experience. They argue that there is no realistic alternative to the family planning program in fertility reduction at the moment.

Based on data from three Asian countries: Taiwan, Singapore and Thailand, Khoo (1977) has analyzed the decline in age-specific fertility rates and assessed the effects of four major fertility variables: program contraceptive use,non-program contraceptive use, changes in marriage patterns and abortion. A computerized program, TABLE4, is used to calculate births averted in the program. The results show that much of the fertility decline can be traced to the effect of increased or more effective contraceptive use, particularly among women over age 25. However, the effect varies from country to country, with proportions ranging from 30 per cent in Taiwan, and 50 per cent in Thailand, to 57 per cent in Singapore. This study is revised later by Khoo and Park (1978) with additional data from Korea. The results of the later study agree quite well with those of the early one.

Srikantan (1977) has studied the performance of family planning programs in 20 countries from different cultural regions, as well as in the states of India. Two program input variables, five program output variables and a number of socioeconomic indicators are selected for the purpose of path analysis and multiple regression analysis. The author concludes from his findings that both socio-economic development and family planning programs have substantial, independent, and about equal impact on fertility reduction. By making information and methods of birth control available to all segments of the population, the family planning programs have a special "spill-over" effect on fertility decline in the presence of social and economic modernization.

One of the most comprehensive studies on world fertility decline, factors contributing to this decline, and implications of this decline was conducted by Tsui and Bogue in 1978. The data used come from 113 developing countries and refer to the period 1968-1975. For the purpose of

multiple regression analysis, the authors adopt eight socioeconomic indicators which represent development factors, and the Mauldin-Berelson scale which represents family planning effort. The results suggest that the primary explanation of observed fertility decline is family planning effort, while socio-economic development accounts for only a small proportion of this decline. If family planning continues, according to the authors' prediction, most developing countries will be at or near replacement level of fertility by the year 2000 and beyond. However, this prediction is viewed by some writers as too optimistic (Demeny,1979; Davis,1984). The development of world population today - almost 10 years after the Tsui and Bogue study - provides no evidence that the replacement level of fertility will soon be achieved in many developing countries, though some, particularly in Asia, are well on the way to this goal.

In the same year, Mauldin and Berelson (1978) also conducted a similar comprehensive study. Based on data from 94 developing countries for the period 1965-1975, a variety of statistical analyses has been employed to quantify the effects of social setting and family planning program: simple correlations, multiple regression, path analysis, exploratory data analysis, and cross-tabulations. Social setting is represented by seven socioeconomic indicators, while family planning program effort is rated on the 1972 Lapham-Mauldin scale. The results suggest that the family planning programs have a significant, independent effect on fertility decline. However, the effect increases substantially if the two factors - social setting and family planning effort - work together. Countries that achieve remarkable progress in socioeconomic development and also make substantial program effort will have much more fertility decline. These findings are confirmed in a recent study by Mauldin and Lapham (1984) based on the same series of data updated through to 1982.

Cutright and Kelly (1981) have studied the role of family planning programs in fertility decline in 81 developing countries from 1958 to 1977. A multivariate

analysis is used to examine the relationship between the changes in birth rate and variables of socioeconomic development and family planning program effort. The results show that organized family planning programs play a major role in reducing the birth rate in the countries studied. Although development also has an important impact on fertility change, its effort is neither as strong nor as rapid as that of program effort. Under current circumstances in developing countries, a family planning program is a more cost-effective strategy to decrease fertility than development programs. So long as there is strong government commitment and effective programs, fertility will decline rapidly and before much higher levels of development are reached. Because development and family planning programs each enhance the effect of the other, the authors maintain that strong support of both types of program is required to reduce fertility to replacement level. The exclusive reliance on development programs to bring about fertility decline, as suggested by some writers, will probably prolong unnecessarily the problems of rapid population growth.

In a USAID (U.S. Agency for International Development) research project of 1984, Ness et al.(1984) assessed the performance and experience of family planning programs in 24 Asian countries over their entire lifetimes. A series of statistical procedures, including regression and path analysis, is used to examine the impact of programs, the variance in program performance, and the conditions that determine program effectiveness. The authors find increasing evidence that family planning programs have an independent and direct effect in lowering fertility rates, by making it easier for people to obtain modern contraceptives. However, the impact tends to be greater in situations where socio-economic development is also conducive to fertility decline. Realizing the fact that program efficiency is influenced by different factors at different phases, the authors suggest two program efficiency measures: acceptors per program staff for new programs and users per program staff for mature programs.

2.4. Conclusion

The empirical findings from national and cross-national studies discussed above suggest that family planning programs have clearly, with only a few exceptions, lowered fertility in program areas. Both family planning programs and socioeconomic development have significant, independent effects on contraceptive use, fertility, and fertility change in developing countries. However, the combined effect on fertility is greater than the sum of these independent effects because of the interaction between the two. This interaction generally means that a favorable social setting strengthens and facilitates the operation of a family planning program. Under similar social and economic circumstances, family planning programs which are better designed, better managed, more closely integrated with other developmental programs, and backed by stronger political support are more likely to effect fertility change.

Chapter 3: FERTILITY CHANGE IN SHAANXI

3.1. Introduction

The retrospective birth history data collected in the 1985 Regional In-Depth Fertility Survey provide us with a rich source for measuring fertility levels and trends in Shaanxi. This chapter examines the changes in fertility during the last three decades, particularly since 1972, the year when the massive campaign for birth control was launched.

There are two sources of data on births from the 1985 survey: the household schedule and the individual questionnaire. Most estimates of fertility are derived from the individual questionnaire, which asks each married woman for a detailed reproductive history, including the outcome and date of each birth (or pregnancy), the sex and survivorship of each live birth, and the date of death, if any, of a child.

The measurement of fertility is normally approached in two ways. The cohort, or cumulative approach, the number of children ever born (CEB) used in this chapter, describes the cumulative birth performance of cohorts of women as they progress through their reproductive years. The period, or cross sectional approach, the age-specific fertility rate (ASFR) used in this chapter, is concerned with the number of births that occur during a specified calendar year. In addition, some demographers also suggest analyzing fertility with the P/F ratio method, which combines data on numbers of children ever born with estimates of cumulative age-specific fertility for the recent past. All three approaches are employed in this chapter. Given the unavailability of the required data, other techniques, such as birth interval and birth order analyses, are not considered here.

3.2. Number of Children Ever Born

As mentioned above, the number of children ever born (CEB) is a cumulative measure of fertility. Usually, this measure falls into two categories: firstly, the number of children ever born, alternatively referred to as current parity, is simply the number of live births each woman has had at the date of interview; secondly, the number of children surviving equals the number of live births minus the number of children who have died. Since child survival is not the major concern in this chapter, the number of children ever born is discussed in the former sense.

The number of CEB provides us with information on the distribution of women by family size, parity progression and the extent of childlessness. The number of CEB per 1000 women aged 45-49 can be taken as an estimate of the completed fertility rate of a population. However, this cumulative measure gives no indication of the tempo of fertility.

Table 3.1: PERCENTAGE DISTRIBUTION OF EVER MARRIED WOMEN, BY AGE AND PARITY OF CHILDREN EVER BORN, SHAANXI, 1985

AGE GROUP	PARITY					TOTAL	(N)	MEAN PARITY
	0	1	2	3	4+			
15-19	73.9	26.1	0.0	0.0	0.0	100.0	46	0.3
20-24	35.9	49.7	12.4	2.0	0.0	100.0	541	0.8
25-29	6.3	38.9	40.2	11.7	2.7	100.0	854	1.7
30-34	1.3	14.8	41.7	28.0	14.4	100.0	857	2.4
35-39	2.2	1.5	16.9	31.7	47.7	100.0	685	3.5
40-44	1.9	2.1	5.2	21.7	69.2	100.0	581	4.3
45-49	0.8	1.9	6.0	13.1	78.2	100.0	520	4.9
15-49	7.9	18.9	23.1	18.7	31.4	100.0	4084	2.6

Source: Calculated from the 1985 Regional In-Depth Fertility Survey data (China Population Information Centre, 1986).

Table 3.1 gives the percentage distribution of ever married women aged 15-49 in Shaanxi according to parity of CEB. As expected, the level of childbearing increases with the age of women. While in the age group 15-19 about three-

quarters of the women are reported to be childless, the proportion of childless women drops to 6.3 per cent in the age group 25-29. That means 95 per cent of married women in Shaanxi will have at least one child by an indeterminate age younger than 29 (probably about 27). As far as the childbearing of younger women is concerned, it is surprising to find that more than one-quarter (26.1 per cent) of married women in the youngest age group have already had one child by the age of 19, despite the fact that the minimum legal age of marriage for females is set at 20 by the 1980 Marriage Law. Given the relatively small sample size (46), this figure clearly does not represent the entire cohort.

As can be seen in Table 3.1, the distribution of women by parity varies greatly among age groups. Whereas in older age groups the majority of women have four or more children, in the intermediate age groups the majority have only two or three children. This indicates that most women in younger age groups will have fewer children than those in older age groups. For example, in the oldest age group 78.2 per cent of women have four or more children, while in the age group 25-29 the corresponding proportion drops to 2.7 per cent. Since the women in the latter age group may not have ceased childbearing, it may be argued that this kind of comparison is not convincing. However, according to the same survey, 82.4 per cent of women with two living children, 94.9 per cent of women with three living children and 99.3 per cent of women with four or more living children state a desire for no more children. For the purpose of family size limitation, 83.4 per cent of these women are using some form of contraception. It is unlikely that the proportion of women with higher parities will much increase in the future.

The last column of Table 3.1 gives the mean number of CEB to women in each age group. The values increase consistently with the increasing age of women, with a peak of 4.9 for the age group 45-49. A drop in reported parity for the oldest age group, as observed in many WFS studies and attributed to the omission of early births, is not found in Shaanxi. This supports the assumption that the 1985 survey data are of good quality. The mean number of CEB to

women in the oldest age group is alternatively referred to as the completed fertility rate. In Shaanxi, this rate (4.9) is a little lower than the national level (5.6) estimated in 1982 based on the 1982 National 1/1000 Population Fertility Survey (Chen Shengli,1984). Relative to women in older age groups, those in younger age groups have far fewer children. For example, in the age group 25-29 the mean number of CEB is only 1.7, 3.2 fewer than that in the oldest age group and even a little lower than replacement level. Since the childbearing of the younger cohort is still imcomplete, the comparison is more relevant in terms of ideal number of children. According to the same 1985 survey, the average ideal number of children among married women in the age group 25-29 is 2.4. Even if this ideal number can be achieved, assuming the absence of strict birth control policies, it is still only half of that completed by women in the oldest age group. This fact clearly evidences a substantial change in people's fertility attitude and behaviour in Shaanxi.

Also with regard to the completed fertility, it is worth noting that the proportion of women aged 45-49 at parity zero (0.8 per cent) is very low in Shaanxi. Childlessness can be caused by the infecundity of couples or the death of children. In a comparative study of the WFS data, Vaessen (1984) concludes that, in the majority (21 out of 28) of countries, the proportion of life-time childless women is about 4 per cent. According to the 1982 National 1/1000 fertility Survey in China, the proportion childless is estimated as 2.7 per cent for the period 1980-1981. The low level of childlessness among older women in Shaanxi is probably caused by misreporting, if sampling errors can be ruled out. Detailed study is needed in this respect.

Another way to describe fertility change, as shown in Table 3.2, is using the parity progression ratio (PPR), also derived from the information about CEB. PPR is the proportion of women of given parity who proceed to have at least one additional live birth. At parity zero, the differences in PPRs among age groups are not large. The overwhelming majority (93.7 per cent and over) of married

women have had at least one child. Because younger women have not yet completed their reproductive period, it is uncertain at this stage how many of them will proceed to have a second, third or fourth child. Nevertheless, since most of the women with four children do not want any more and are using efficient contraceptives, the drastic drop in PPR for parity four indicates to an extent a change in fertility behaviour among younger women in Shaanxi. For example, in the oldest age group, 74.9 per cent of women with four children will go on to have their fifth child, while in the age group 30-34, only 23.7 per cent will do so.

Table 3.2: PARITY PROGRESSION RATIO, BY SELECTED AGE GROUP, SHAANXI, 1985

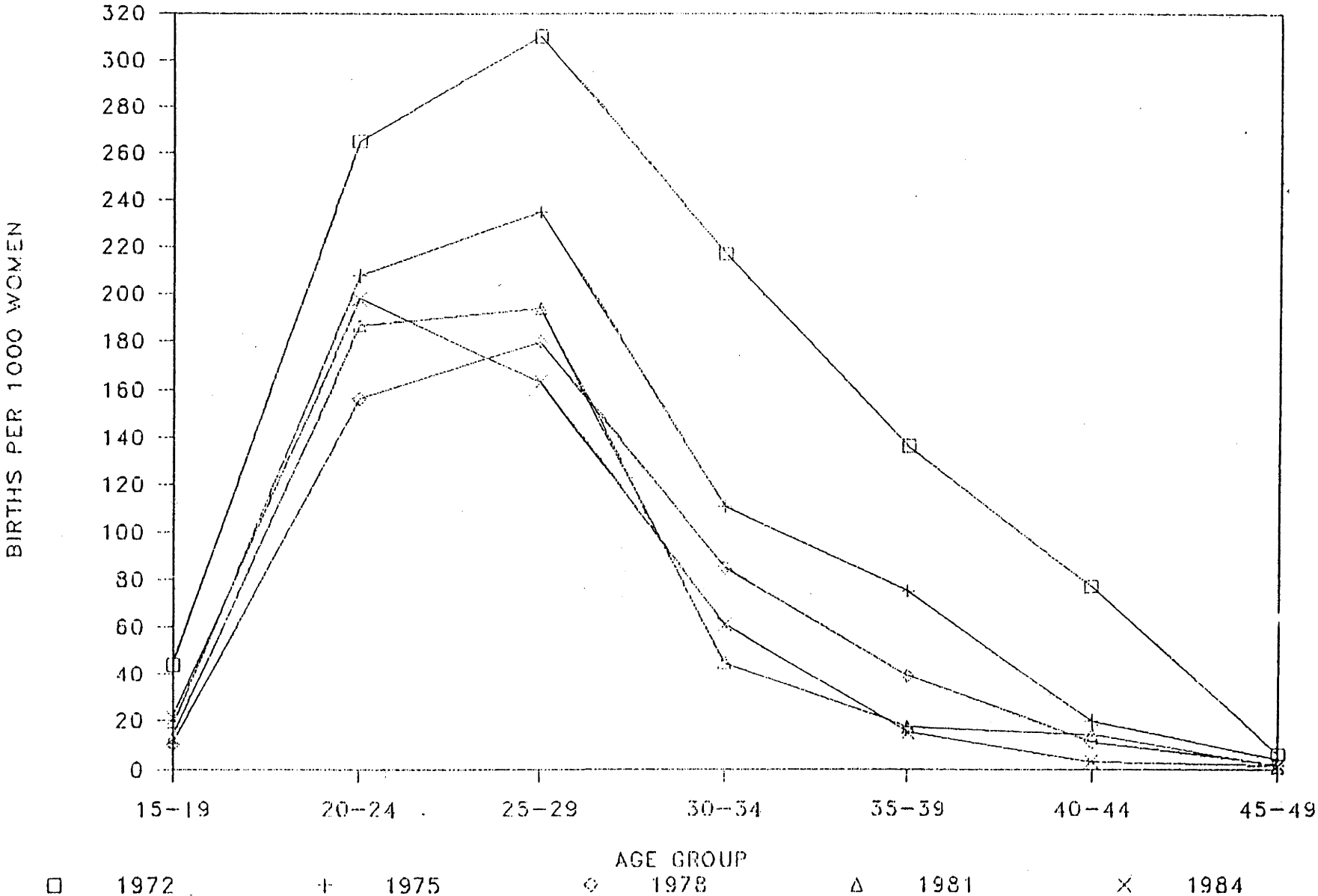
AGE GROUP	PARITY				
	0	1	2	3	4
30-34	98.7	85.0	50.3	33.7	23.7
35-39	97.8	98.5	82.4	60.1	42.8
40-44	98.1	97.9	94.6	76.1	60.7
45-49	99.2	98.1	93.9	85.7	74.9

Source: Calculated from the 1985 Regional In-Depth Fertility Survey data(China Population Information Centre, 1986).

3.3. Fertility Rates

As opposed to cumulative fertility, the fertility rate is a measure that deals with the fertility level of a population during a specified period. The age-specific fertility rate (ASFR) is defined as the "fertility rate with the number of live births during a given year born to women of a given age as the numerator, and the number of person-years lived by that age of women during the year as the denominator" (Verma,1980:11). Usually, the denominator includes all women of reproductive age in a given age group, irrespective of their current marital status. Since the ASFR here is derived from the 1985 survey data, the numerator consists of all live births recorded on individual questionnaires, while the denominator consists of all eligible women recorded on household schedules.

Figure 3.1: AGE-SPECIFIC FERTILITY RATES, BY AGE GROUP AND SELECTED YEARS, SHAANXI



Source: Calculated from the 1985 In-Depth Fertility Survey data.

Figure 3.1. presents the pattern of ASFR of selected years from 1972 to 1984. As mentioned in Chapter 1, 1972 was the year when the massive birth control campaign was officially launched in China. The figure shows clearly that the ASFR of 1972 was the highest, representing a typical pattern of pre-transition fertility. Early marriage and early first births pushed up the ASFRs quickly among younger women, from 44 per thousand in the age group 15-19 to 265 per thousand in the age group 20-24. After reaching a peak level of 310 per thousand among women in the age group 25-29, fertility decreased only slowly among women in intermediate and old age groups, indicating that there has been no sizable fertility control.

In just three years, the pattern of fertility changed so considerably that, in 1975, a large gap emerged between the ASFRs in every age group. For example, in the age group 25-29 the fertility rate of 1975 was 24.2 per cent lower than that of 1972. Fertility dropped further in 1978. In the age group 20-24, it reached the lowest level of 156 per thousand. This is believed to have been a result of the Late Marriage campaign. As fertility moved from the high to the low levels, the curves have become increasingly pointed, that is, fertility has become more concentrated to the centre of the reproductive age range. In younger age groups, fertility decline is caused mainly by late marriage and late childbearing, whereas in older age groups, fertility decline is caused mainly by contraceptive practice. The impact of contraceptive practice on fertility among older women is particularly pronounced in the years 1981 and 1984. For example, in the age group 35-39, the fertility rate in 1981 is only one-tenth of that in 1972. In 1981 and 1984, a slight increase in fertility rate can be observed in younger age groups. However, it is still lower than the level of 1975.

It is interesting to look at the ASFR of 1984. Instead of forming a peak in the age group 25-29 as expected, fertility drops to a disproportionately low level. According to the same 1985 survey data, a similar pattern is also

found in Hebei. Since the 1984 rates are computed from the births which occurred just one year prior to the survey and believed to be more accurate than other rates, the unique ASFR curve shows that in 1984 women tended to have children a little earlier than in previous years. During the climax of the Late Marriage Movement in the late 1970s, young women were encouraged to get married at 23 or over. In 1980 the new Marriage Law finally set the minimum age of marriage for females at 20. It coincided with a time when large cohorts born during the baby-boom of the mid- and late 1960s entered their marriage and childbearing ages. Consequently, a marriage boom followed (Coale, 1984). Since only a small proportion of women immediately progressed to parity two, the peak of ASFR is formed in the age group 20-24, instead of the age group 25-29.

Total fertility rate (TFR) is not a rate in its original sense, but the number of children a women would have throughout her lifetime, had she experienced the prevailing level and pattern of fertility as measured by ASFR. Relative to ASFR, TFR is a more straightforward measure of fertility levels. As shown in Table 3.3, the TFR drops substantially from 5.3 in 1972 to 2.3 in 1984 in Shaanxi. A remarkable decline (2.1) is observed between 1972 and 1975. In other words, a woman would have three children fewer in 1984 than in 1972, had she experienced the fertility level of the respective periods.

Unlike ASFR which describes level and pattern of fertility among all women of reproductive ages, the age-specific marital fertility rate (ASMFR) describes the fertility behaviour of married women. Based on ASMFR derived from the 1985 survey data, this section makes use of two parameters, "M" and "m", of marital fertility, proposed by Coale in 1971 and improved by Coale and Trussell in 1978, to examine the fertility change in Shaanxi with respect to the deviation from natural fertility and the degree of deliberate fertility control. Coale's model of marital fertility (Coale,1971) can be denoted as follows:

$$r(a)/n(a) = Mxe^{mv(a)}$$

where: r(a) = observed marital fertility at age (a);
n(a) = natural fertility at age(a), empirically derived from ten schedules of natural fertility;
M = a scale factor defining the level of marital fertility, independent of its age pattern;
m = an index of marital fertility control;
e = base of natural logarithm;
v(a) = logarithmic deviation from natural fertility.

Natural Fertility is defined by Henry (1961:84) as "the fertility which exists or has existed in the absence of deliberate birth control". The functions n(a) and v(a) are computed from empirical data (Coale and Trussell, 1974). To find the two parameters of "M" and "m", a FORTRAN computer program (Coale and Trussell, 1978) is applied to ASMFR for the period 1972-1984. The results are given in Table 3.3. Since "M" is an indicator of natural fertility, or the fecundity of a population, it will not be discussed in detail here.

Table 3.3: COALE AND TRUSSELL'S M, m, MEAN SQUARE ERROR (MSE), AND TFR, BY SELECTED YEARS, SHAANXI

YEAR	M	m	MSE	TFR
1972	0.818	0.510	0.0081	5.3
1975	0.770	1.199	0.0096	3.2
1978	0.729	1.720	0.0009	2.4
1981	0.851	2.610	0.0183	2.3
1984	0.827	2.694	0.0062	2.3

Source: Calculated from the 1985 Regional In-Depth Fertility Survey data, and computer program printout.

According to the original authors, "m" is so constructed that it will equal 0 when the age pattern of fertility above 20 is identical to that of natural fertility. A value of "m" = 1.0 represents the average deviation from natural fertility found in 43 empirical

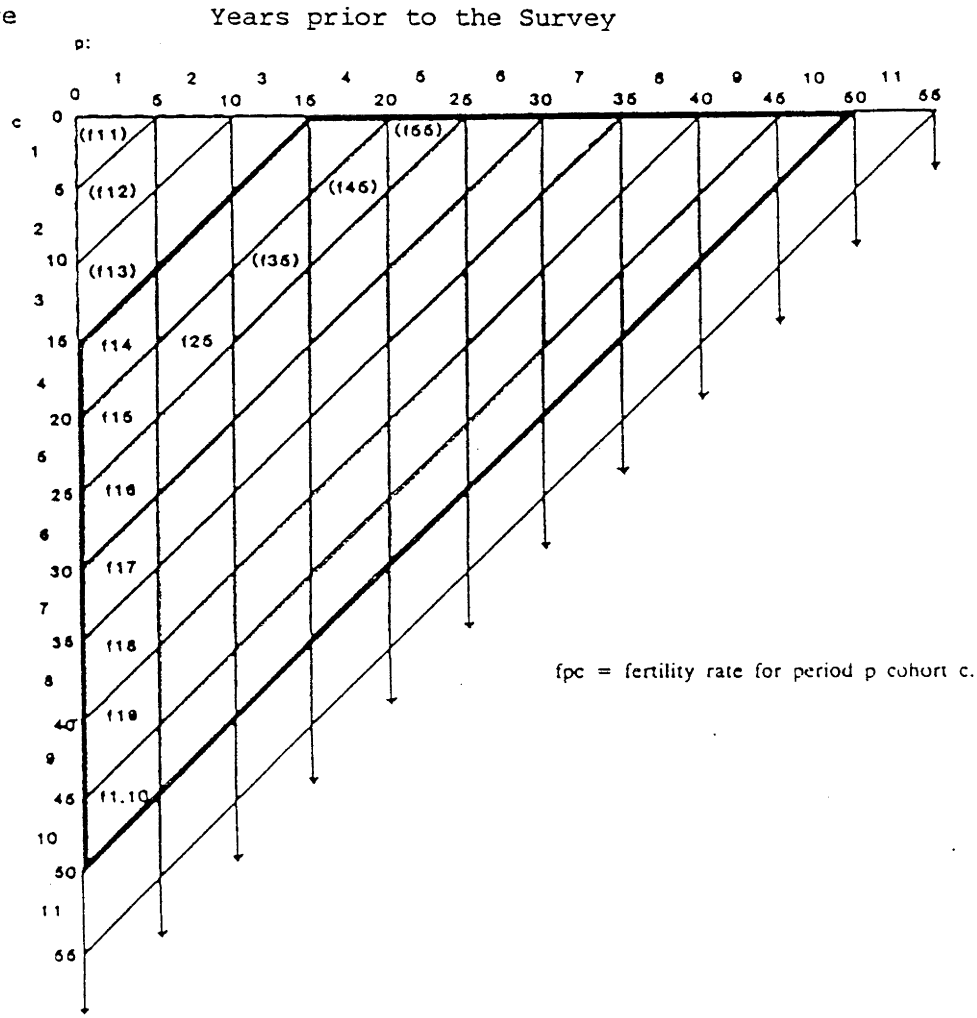
studies. As shown in Table 3.3, the "m" value in Shaanxi is quite low in 1972, when there was no government sponsored birth control programs. It is very close to the level recorded in Denmark in 1900, or in Taiwan in 1963 (Lavel ,1986). Between 1972 and 1975, the "m" value rises considerably from 0.5 to 1.2 in response to massive birth control campaigns. Another big jump from 1.7 to 2.6 is observed between 1978 and 1981, when the One-Child Policy was enforced. The momentum of birth control and fertility decline is kept through until 1984.

With regard to goodness of fit of the model, Coale and Trussell have classified a mean square error (MSE) of 0.005 as a "mediocre" fit, and of 0.01 as a "terrible" fit. As can be seen in Table 3.3, MSE fluctuates over the years, indicating a mediocre fit of the model. The only poorer fit is the MSE of 1981. The possible reason is that, as warned by Coale, the parameter "m" is not necessarily applicable to periods of rapid fertility change. However, as Lavely (1986:425) points out in his study on China's marital fertility, "even when the model is a poorer fit, the parameter can be a useful diagnostic tool for comparing the age pattern of controlled fertility to a standard model of controlled fertility." For example, the "m" value of 1975 in Shaanxi is 1.2, which already exceeded the average departure from the natural fertility recorded in 43 fertility schedules. In 1984, the "m" value in Shaanxi reaches 2.7, that is, 2.7 times as high as the average. It indicates a very high degree of deliberate birth control and a quite unique pattern of marital fertility in Shaanxi.

3.4. Cohort-Period Fertility Rates

Cohort-period fertility analysis, alternatively referred to as the P/F ratio method, is a frequently used indirect technique to estimate recent fertility, to analyze trends in fertility, and to examine the quality of survey data. Originally developed by Brass (1968), the method has been advanced subsequently by Hobcraft et al.(1982) on the base of completed maternal histories collected in the World

Figure 3.2: THE LEXIS DIAGRAM



Source: Goldman and Hobcraft, 1982.

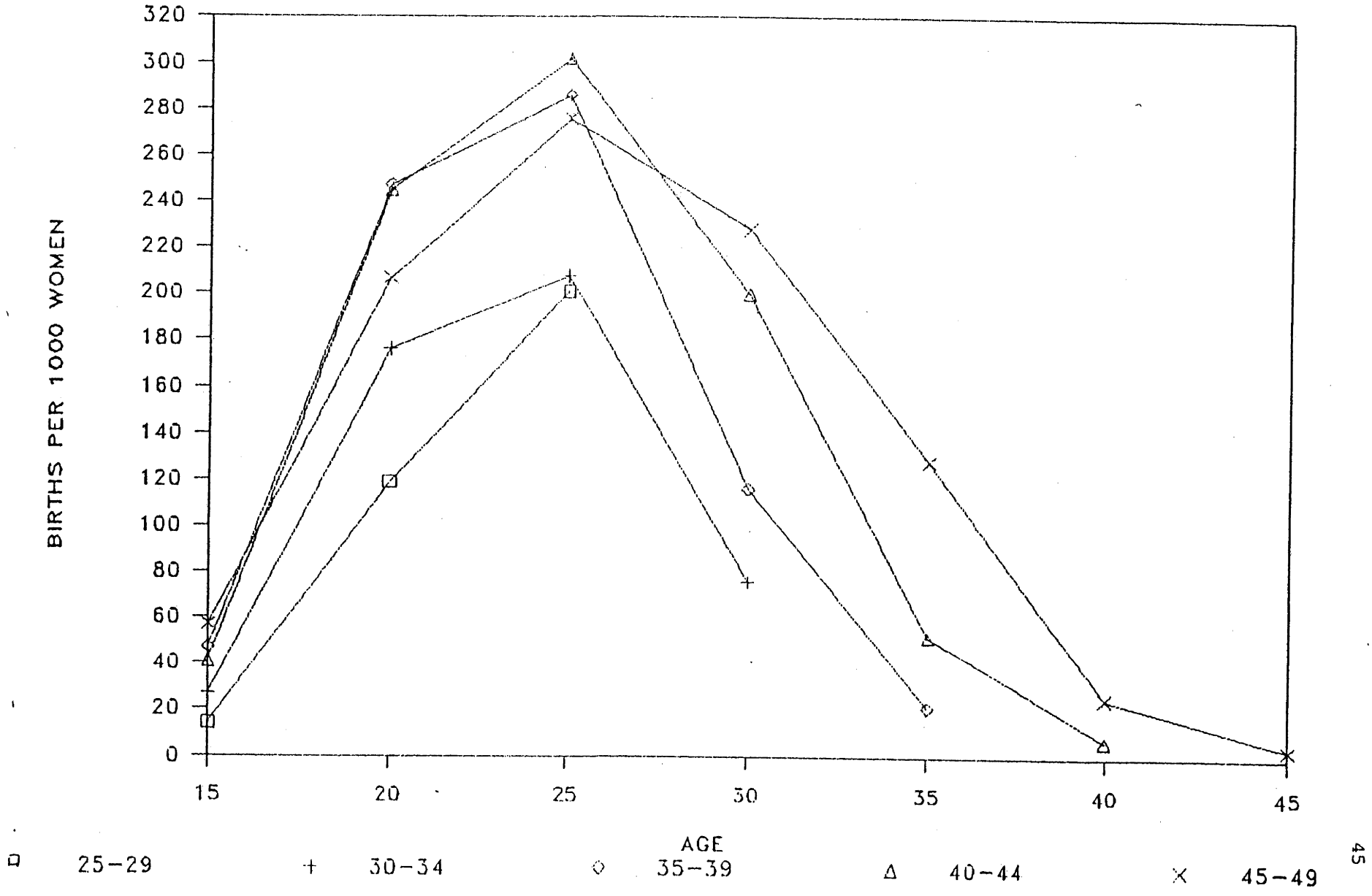
Note: The area outlined in bold corresponds to the data available from the retrospective maternity hastory.

Table 3.4. COHORT-PERIOD FERTILITY RATES, CUMULATED RATES BY COHORT AND PERIOD, AND P/F RATIOS, BY AGE GROUP, SHAANXI, 1985

AGE GROUP	REFERENCE PERIOD (19--)						
	'80-'84	'75-'79	'70-'74	'65-'69	'60-'64	'55-'51	'50-'54
A. COHORT-PERIOD FERTILITY RATES (per 1000)							
15-19	4						
20-24	96	6					
25-29	201	119	14				
30-34	76	208	176	27			
35-39	21	116	286	247	47		
40-44	7	52	200	302	245	41	
45-49	4	25	128	228	276	207	57
B. CUMULATED FERTILITY OF COHORTS AT END OF PERIOD(P)							
15-19	0.022	0.030	0.069	0.134	0.237	0.206	0.286
20-24	0.510	0.663	1.015	1.472	1.430	1.322	
25-29	1.669	2.055	2.900	2.940	2.702		
30-34	2.433	3.480	3.938	3.843			
35-39	3.585	4.198	4.482				
40-44	4.234	4.605					
45-49	4.626						
C. CUMULATIVE FERTILITY WITHIN PERIODS(F)							
15-19	0.022	0.030	0.069	0.134	0.237	0.206	0.286
20-24	0.503	0.624	0.950	1.368	1.461	1.243	
25-29	1.509	1.663	2.378	2.879	2.841		
30-34	1.887	2.244	3.376	4.019			
35-39	1.992	2.504	4.015				
40-44	2.028	2.626					
45-49	2.049						
D. P/F RATIO							
15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
20-24	1.015	1.063	1.069	1.076	0.979	1.064	
25-29	1.106	1.235	1.219	1.021	0.951		
30-34	1.289	1.551	1.166	0.956			
35-39	1.800	1.677	1.116				
40-44	2.088	1.753					
45-49	2.258						

source: Calculated from the 1985 Regional In-Depth Fertility Survey data.

Figure 3.3: COHORT-PERIOD FERTILITY RATES, BY COHORT AND AGE, SHAANXI, 1985



Source: Calculated from the 1985 In-Depth Fertility Survey data.

Fertility Surveys. Cohort-period fertility rates, like cohort-age and age-period fertility rates, can be derived by applying the Lexis diagram. As can be seen in Figure 3.2, the relevant rates are obtained by dividing the number of births in a cell by the number of women in the cohort and the average number of years of exposure to risk within the cell. On the diagram, "Fpc" represents the fertility rate of period "p" and cohort "c". Rates for a given period are located within a column, while rates for a given cohort are located along a diagonal.

In this section, only the trend in fertility is discussed, assuming that the 1985 survey data are of good quality and the response error is negligible. Panel A of Table 3.4 gives the cohort-period fertility rates of all women in the cohort, regardless of their marital status. The cumulative fertility of cohorts at end of period (P values in Panel B), the cumulative fertility within periods (F values in Panel C), and the P/F ratio (Panel D) are rearranged for convenience of comparison at controlled ages.

Figure 3.3 illustrates the shape of cohort-period fertility rates for selected cohorts. Although all the five curves are pointed at 25 years of age, indicating the most fertile period of women, the level and pattern of fertility vary considerably among cohorts. For the women in the oldest cohort 45-49, childbearing began early, with the fertility rate being 57 per thousand by the age of 15. Afterwards, fertility increased moderately and reached a peak of 276 per thousand at the age of 25, lower than that of the two subsequent cohorts. Referring to the period 1955-1964, this lower fertility can be well explained by the impact of the crop failure and economic depression from 1959 to 1961. A similar pattern of low fertility during the famine years is also found in the 1982 National 1/1000 Fertility Survey results (Coale and Chen, 1987). In an analysis of China's fertility data, Caldwell and Srinivasan (1984) attribute this phenomenon to people's response to famine, mainly through use of traditional methods of fertility control, such as sexual abstinence, abortion and withdrawal. However,

when the women of this oldest cohort entered their intermediate ages, they kept a quite high level of fertility.

A trend of fertility decline is well established in the subsequent cohorts. In contrast to the cohort 45-49, the cohort 40-44 experienced the highest fertility level (302 per thousand at the age of 25) during the post-famine period and the Cultural Revolution. Also the cohort 35-39 reached a similar high level (286 per thousand at the age of 25) before the massive birth control campaign was introduced in 1972. However, in the following years the fertility of this cohort dropped very quickly. By the age of 35, they already had a fertility rate (21 per thousand) that was even lower than that (25 per thousand) of the cohort 45-49 by the age 40. The impact of family planning is particularly apparent when the fertility of the cohorts 30-34 and 25-29 is considered. Under the "Wan, Xi, Shao" (Later Marriage, Longer Spacing, and Fewer Children) Policy and the One-Child Policy, women in these cohorts started childbearing later but stopped earlier. Consequently, their fertility is the lowest.

Cumulative fertility of a cohort, denoted as the P value in Panel B of Table 3.4, is five times the horizontal summation of cohort-period fertility rates (Panel A) by the end of each period. It corresponds to mean parities that cohorts have achieved. Since the P values are so arranged that they can be compared with each other at controlled ages, it is apparent that younger women have increasingly fewer children compared with the older women. For example, at the same age of 30-34, women in the cohort 30-34 have 2.4 children on average, 1.4 fewer than those in the cohort 45-49.

Cumulative fertility within the period, denoted as F value in Panel C of Table 3.4, is five times the vertical summation of cohort-period fertility rates (Panel A). It represents mean parities that a synthetic cohort would achieve at different ages, had it experienced the prevailing fertility rates of the period. For example, at the same age

of 30-34, women in the synthetic cohort would have 1.9 children in 1980-1984, 2.1 fewer than that they would have in 1965-1969. According to Goldman and Hobcraft (1982), the F value of the oldest cohort should be very close to the conventional TFR in the same period. Here the F value for 1980-1984 is 2.1, a little lower than the 1984 TFR of 2.3 as shown in Table 3.3.

Remarkable change in fertility is also evident in the examination of P/F ratios (Panel D). When constant fertility prevails, according to Brass (1980), P/F should approximate to one. Greater or less than unity suggests either a change in fertility, or response error. Since the latter factor is excluded from this study, the P/F values greater than one are more likely to indicate a drastic fertility decline in Shaanxi. Taking into account the reference period, it is worth noting that before 1970-1974, fertility change is not substantial, with most P/F ratios close to one. Those smaller than one represent a real low fertility during the famine years, as discussed above. However, fertility decline becomes apparent in the 9 years prior to the survey, particularly in the intermediate and older cohorts. The onset of this decline is closely associated with the enforcement of government family planning programs. For example, the P/F ratio for the cohort 45-49 during the period 1980-1984 reaches a peak of 2.3, higher than any of the WFS countries estimated by Goldman and Hobcraft (1982).

3.5. Conclusion

The examination of the 1985 Regional In-Depth Fertility Survey data shows clear evidence of fertility decline in Shaanxi, particularly among women aged 30 and over and during the 9 years prior to the survey. As opposed to women in older cohorts, women in younger cohorts tend to start childbearing later, have fewer children at the same reference ages, and want no more high parity births, in other words, stop childbearing earlier. This decline in fertility is closely associated with the rigid

implementation of government family planning programs (1972 onward).

Women in the oldest age group experienced a low level of fertility during the period 20-25 years prior to the survey. This is identical to findings from other studies on Chinese population, that the 1959-1961 famine had a strong impact on people's fertility behaviours (Coale,1984; Chen,1984; Lavely,1986). Despite the government's persistent efforts in pursuing the One-Child Policy, it is found that only 18.9 per cent of couples have one child, suggesting that the idea of the one-child family has not been widely accepted at the present stage. In recent years, a slight increase in fertility rates has been observed, as a result of the entering of large cohorts into reproductive ages. Special measures should be directed to those women who get married and have children earlier than the minimum marriage age of 20.

Chapter 4. FAMILY PLANNING PROGRAM PERFORMANCE IN SHAAHXI

4.1. Introduction

The family planning program is referred to in China as the planned birth program, implying that the priority of the program is to spread the idea of birth control and information on contraception, and to provide contraceptive services. Therefore, the family planning program can be evaluated through indicators of contraceptive knowledge and practice. In China, service statistics on contraceptive acceptors are collected and published annually by Family Planning Commissions at various levels. In recent years, survey data at national or provincial levels have also become available. Based on World Fertility Survey (WFS) experience and covering a broad range of topics, the 1985 Regional In-Depth Fertility Survey is the first effort in China to understand in depth women's knowledge of, attitude to and practice of contraception. This chapter examines and discusses program performance in Shaanxi in terms of contraceptive knowledge and practice, as well as differentials in contraceptive use.

4.2. Knowledge of Contraception

In the early literature on fertility, some demographers held that "significant relationships between psychological factors and fertility simply have not been found. Perhaps the relationships do not exist" (Mauldin, 1965). However, recent results from KAP (knowledge, attitude, and practice of contraception) studies conducted in developing countries have confirmed the effect of psychological factors, subsumed under "knowledge and attitude", on people's fertility behaviour and contraceptive practice (Stycos,1984). Experience shows that a successful program is characterised

by not only meeting existing demand for contraception, but also in creating new demand through education and communication. In this context, knowledge of contraception can be used as an indicator of program performance.

The definition of "knowledge" used in the 1985 survey implies that the respondent had heard of some method or of a particular method of contraception. It does not imply knowledge of how to use a method or sources of supply. Each method is asked about separately. There are special codes for spontaneous answers and answers after probing. If the answer is affirmative, then the respondent will be asked about whether or not she has used the method. In this chapter, for the purpose of comparison, contraceptive methods are divided into two groups: program methods and non-program methods (see Table 4.1). The former indicate the methods provided largely by family planning programs (the pill, the IUD, the condom, injection, and sterilization), while the latter are contraceptives obtained from other sources or traditional methods (douche, withdrawal, rhythm, female scientific contraceptives, and others). The percentage of women who know a particular method is shown in Table 4.1.

As observed in Table 4.1, 95 per cent of all married women report knowledge of at least one method. There is a noticeable difference between knowledge of program methods and knowledge of non-program methods. Methods promoted by the program are better known among women interviewed. Except for injection (38.9 per cent), all other program methods have been heard of by the majority of the respondents. Nearly 95 per cent of all women have heard of the IUD and tubectomy (female sterilization), 83.5 per cent have heard of vasectomy (male sterilization), and nearly two thirds have heard of the pill (66.5 per cent) and condom (62.9 per cent). In contrast, non-program and traditional contraceptives are less commonly known, with less than one-quarter of the women having heard of rhythm (24.2 per cent) or other female scientific contraceptives (23.5 per cent), 14.1 per cent having heard of withdrawal, and 10.3 per cent

Table 4.1: PERCENTAGE DISTRIBUTION OF EVER-MARRIED WOMEN, BY AGE AND KNOWLEDGE OF PARTICULAR CONTRACEPTIVE METHOD, SHAANXI, 1985

METHOD KNOWN	AGE GROUP							
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	TOTAL
PILL	50.0	51.4	63.6	70.9	73.5	70.3	68.1	66.5
IUD	76.1	81.3	95.1	98.4	97.8	97.3	96.0	94.6
CONDOM	34.8	50.1	62.3	66.4	65.1	67.8	65.6	62.9
INJECTION	15.2	25.3	39.2	43.6	41.8	43.3	38.1	38.9
VASECTOMY	54.3	70.1	83.3	87.1	87.2	86.7	86.5	83.5
TUBECTOMY	87.0	86.9	95.0	97.7	97.5	95.6	96.3	95.0
DOUCHE	2.2	4.6	12.0	12.5	8.8	10.8	11.7	10.3
RHYTHM	8.7	17.2	27.5	27.3	24.2	25.3	21.0	24.2
WITHDRAWAL	2.2	7.9	15.1	15.6	14.9	14.8	15.6	14.1
FEMALE SCIENTIFIC CONTRACEPTIVES	10.9	13.1	21.6	25.7	27.1	26.7	26.7	23.5
OTHERS	0.0	0.2	1.2	1.8	2.8	3.2	1.9	1.8
AVERAGE NO. OF METHODS KNOWN	3.4	4.1	5.2	5.5	5.4	5.4	5.3	5.2

Source: The 1985 Regional In-Depth Fertility Survey data China Population Information Centre, 1986).

Note: Female scientific contraceptives include mechanical and chemical barriers.
Others methods include herbs, abstinence and so on.

Table 4.2: COMPARISON OF PREVALENCE OF CONTRACEPTIVE KNOWLEDGE AMONG MARRIED WOMEN, BY REGION AND METHOD (per cent)

REGION	METHOD				
	PILL	IUD	CONDOM	TUBECTOMY	VASECTOMY
SHAANXI	66.5	94.6	62.9	95.0	83.5
HEBEI	88.0	98.2	77.5	98.2	94.0
KOREA	94.0	91.0	75.0	66.0	84.0
THAILAND	92.0	86.0	48.0	87.0	70.0
INDONESIA	70.8	50.0	40.7	11.3	.7.9
SRI LANKA	59.0	35.0	19.0	49.0	na

Source: The 1985 Regional In-Depth Fertility Survey data (China Population Information Centre, 1986).
WFS, Summary of Findings, No.6, No.7, No.8, 1978.
Freedman et al., 1981.

having heard of douche. Contraceptives that are grouped in the category of "Others" include herbs, abstinence and other folk methods. Unlike the case in some other developing countries, these methods are the least known methods inChina, with only 1.8 per cent of women in Shaanxi having heard of them.

Women's familiarity with specific methods can be further examined through the proportion of spontaneous replies in all positive responses. Of all women reporting knowledge of contraceptive methods, the proportion of spontaneous responses is high with respect to program methods. This proportion stands the highest at 81.2 per cent in the case of the IUD, 74.4 per cent for tubectomy, 66.2 per cent for the pill, 61.5 per cent for vasectomy, 54.4 per cent for the condom, and 40.3 per cent for injection. In comparison, only about one-third of women mentioned non-program methods spontaneously. The rest confirmed their knowledge merely after the interviewer's probing.

It is interesting to compare contraceptive knowledge of the five main program methods in Shaanxi with that in other regions in China and in other Asian countries (see Table 4.2). The data about contraceptive knowledge in Shaanxi and Hebei come from the same survey - the 1985 Regional In-Depth Fertility Survey. The pattern of prevalence is similar in these two provinces, with tubectomy and the IUD being the most well-known methods. However, the general level of knowledge in Shaanxi is lower than that in Hebei. In contrast, it is the pill that appears to be most popular in other Asian countries. The data about contraceptive knowledge in Korea, Thailand, Indonesia and Sri Lanka are taken from the WFS results. In all four countries, those having heard of the pill make up the largest percentage of all women interviewed. Actually, the pill is widely available in China, and is also considered easier to use in comparison with tubectomy and the IUD. The relative unpopularity of the pill is largely due to the bias in policy emphasis. As observed by Chen and Kols (1982:J-600), "the demands of the One-Child campaign ...lead the program

to emphasize ...the long-term, highly effective methods - the IUD and sterilization". As China's population policy has becomed more relaxed since 1985 and as people have become increasingly interested in reversible contraceptives, a broader recognition of the pill can be expected in the coming years.

As is also shown in Table 4.1, there are moderate differences in the prevalence of contraceptive knowledge between age groups. Judged by any of the methods, women aged 30-34 have the highest level of knowledge, with about 98 per cent having heard of the IUD and tubectomy. As far as the family planning program is concerned, this figure is of great significance. The majority of women in this age group have already had the number of children they want, but they are still in the fertile years of childbearing. Their knowledge and interest are decisive factors in enhanceing acceptance and continuation of contraceptive use. On the other hand, women in the youngest and the oldest age groups tend to have lower levels of knowledge than women in the intermediate age groups. However, these differences are not substantial.

Perhaps the most striking finding from the study on contraceptive knowledge in Shaanxi is the fact that, among women who know of any method, the average number of methods known is 5.2. Of all seven age groups, five have an average number of methods known greater than 5, with the highest of 5.5 in the age group 30-34. Only women in the two youngest age groups know fewer methods, but still more than three. This high level of contraceptive knowledge is convincing evidence that the family planning program in Shaanxi is very successful in spreading contraceptive information among all eligible women. It is particularly important as the more options a woman knows and can choose from, the more guaranteed is the efficiency of future contraceptive practice. A potential user can choose the most appropriate form of contraception to suit different situations. Of course, it should also be born in mind that knowledge is only a precondition for use. Without changes in attitude or

easily available supplies, knowledge does not necessarily create new demand needs.

4.3. Contraceptive Practice

In terms of timing, contraceptive use is usually discussed in two categories: ever use, which implies use at any time; and current use, which implies use at the time of interview. As mentioned above, in the interview, the question about knowledge of each contraceptive method was directly followed by the question about ever use. Specific questions about current use and the history of use were raised in a separated section. All this information provides a better understanding of the situation of contraceptive use in Shaanxi.

4.3.1. Ever Use of Contraception

Table 4.3 shows the proportion of women in each age group who have ever used a specific method of contraception. The finding confirms the widespread use of contraception since the introduction of family planning programs. Like the pattern of knowledge, the age pattern of ever use also displays an inverted U-shape with a peak at the intermediate ages from 30 to 39. Experience of contraception was relatively low among the younger age groups. In terms of particular method, more than 85 per cent of women have used the IUD and tubectomy.

Compared with contraceptive knowledge, the percentage of women who have ever used a method is much lower. For instance, while 66.5 per cent of women have heard of the pill, only 7 per cent have ever used it. The lowest usage, less than one per cent, is observed in non-program or traditional methods which are grouped under the label of "Others". On average, each woman has used only 1.1 methods of contraception, which is just one-fifth of the methods she possibly knows (5.2). In China, apart from the above-mentioned policy bias that favours only one or two specific methods, it is believed that personal preference or availability of alternatives can also influence the methods

Table 4.3: PERCENTAGE DISTRIBUTION OF EVER-MARRIED WOMEN, BY AGE AND CONTRACEPTIVE METHOD EVER USED, SHAANXI, 1985

METHOD EVER USED	AGE GROUP							
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	TOTAL
PILL	0.0	2.2	4.5	8.4	8.8	8.5	10.2	7.0
IUD	0.0	19.8	53.5	77.3	81.0	70.8	58.5	61.1
CONDOM	0.0	1.3	6.5	6.2	4.4	8.7	10.6	6.1
INJECTION	0.0	0.2	0.4	0.9	0.3	0.5	0.0	0.4
VASECTOMY	0.0	0.7	3.1	5.5	3.5	2.7	1.7	3.1
TUBECTOMY	0.0	2.8	20.5	39.7	40.2	24.2	12.5	24.9
RHYTHM	0.0	1.1	3.2	2.8	2.2	2.8	2.7	2.5
WITHDRAWAL	0.0	0.4	2.1	1.4	1.0	2.7	3.1	1.7
OTHERS	0.0	0.4	0.9	0.4	1.0	1.3	0.6	0.7
AVERAGE METHODS USED	0.0	0.3	0.9	1.4	1.4	1.2	1.0	1.1

Source: The 1985 Regional In-Depth Fertility Survey data (China Population Information Centre, 1986).

Table 4.4: PERCENTAGE DISTRIBUTION OF EVER-MARRIED WOMEN, BY AGE AND CONTRACEPTIVE METHOD CURRENTLY USED, SHAANXI,1985

METHOD CURRENTLY USED	AGE GROUP							
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	TOTAL
PILL	4.3	1.7	1.3	1.2	0.3	2.3	1.9	1.4
IUD	4.3	17.4	30.2	35.9	45.4	51.2	44.6	36.6
CONDOM	0.0	0.9	1.8	1.5	0.7	1.8	1.9	1.4
INJECTION	0.0	0.2	0.1	0.1	0.0	0.4	0.0	0.1
VASECTOMY	0.0	0.7	3.1	5.5	3.5	2.7	1.7	3.1
TUBECTOMY	0.0	2.8	20.5	39.7	40.2	24.2	12.5	24.9
RHYTHM	0.0	0.4	1.2	0.8	0.7	0.5	0.0	0.7
WITHDRAWAL	0.0	0.2	0.6	0.1	0.3	1.1	0.6	0.4
OTHERS	0.0	0.9	0.9	0.3	0.2	1.8	0.4	0.7
USER	8.7	24.2	59.4	85.1	91.5	84.8	63.5	69.0
NON-USER	91.3	75.8	40.6	14.9	8.5	15.2	36.5	31.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(N)	(46)	(541)	(852)	(853)	(679)	(566)	(480)	(4017)
NOT STATED (N)								(67)

Source: The 1985 Regional In-Depth Fertility Survey data (China Population Information Centre, 1986).

used. Actually, as far as the aggregate effect of contraception is concerned, it is the efficiency of a method that counts. If a woman chooses one efficient method for birth control and feels comfortable with it, then, there will be no need for her to switch to other methods frequently. As shown in Table 4.3, the most commonly used methods are the long-term and efficient ones - the IUD and sterilization. Their part in reducing fertility is of great importance.

4.3.2. Current Use of Contraception by Age

Table 4.4 shows the proportion of women in each age group who were currently using a particular method of contraception at the time of interview. Data on current use are restricted to currently married non-pregnant women, including those considering themselves to be infecund. Of the 4017 exposed women in the sample, 69 per cent were using a method of contraception or had been sterilized for contraceptive purposes. This high rate of contraceptive use is identical with the national level (69 per cent) observed in the 1982 survey, and very close to the use rates of other more industrialised countries (68 per cent in the USA, 73 per cent in Canada, and 69 per cent in Japan; see Poston,1986). Here the program effort is also evident.

When broken down by method, it is found that over 97 per cent of current users rely on "efficient" or program methods. The dominant position of the IUD, which accounts for more than half (53 per cent) of all users, can be clearly seen. Tubectomy is the next most prevalent method, making up another 36.1 per cent of users. In contrast, vasectomy is far less popular, with only 4.5 per cent of users employing it. That means, about nine out of ten sterilizations are performed on women. Added together, the rest of the program methods, namely the pill, condom and injection, contribute only a small share of 4.2 per cent to the user pool. Use of the other methods is least common. Only 2.6 per cent of users are relying on "inefficient", or non-program methods, mainly rhythm and withdrawal.

Looking at the age distribution of current users, an inverted U pattern is observed as in the case of ever use. The highest proportions protected by contraception are found in the intermediate age groups. For instance, among women aged 35-39, 91.5 per cent are using some form of contraception. In comparison, three-quarters of the women under 25 are non-users. Also, for those in the older age groups, contraception becomes unnecessary as the number of infecund women increases. But the drop is not substantial. In the age group 45-49, there are still 63.5 per cent of women using contraceptives, higher than the proportion fecund (48 per cent) as estimated by Bongaarts (1980).

In World Fertility Survey (WFS) studies, the pill is the most frequently reported method currently used (Carrasco,1981). Pill use often declines with age while IUD use increases, suggesting that the pill tends to be used as a method for spacing of children, and the IUD as a method for family limitation. But, as discussed in the section on contraceptive knowledge, the WFS findings do not agree well with the case of China. As seen from Table 4.4, the prevalence of the pill in Shaanxi is very low, and fluctuates among age groups. On the other hand, the use of the IUD and tubectomy increases very quickly with age. This situation can be well explained by the fact that, under the strict government fertility policy, particularly the One-Child Policy, birth spacing has become increasingly less important. Contraceptive use is predominantly motivated by family limitation through relatively efficient and permanent methods. Some studies on patterns of contraceptive use in China conclude from the 1982 1/1000 Fertility Survey data that the IUD is more popular among younger women, while tubectomy is more common among older women (Chen,1984; Poston,1986). However, this pattern is not pronounced in Shaanxi, except for an understandable earlier use of the IUD. In the age group 40-44, for instance, IUD users (290) are twice the number of tubectomy users (137).

Despite the achievements of family planning discussed above, special attention should be paid to non-users,

particularly to those in younger age groups, if further decline in fertility is expected. For example, in the age group 20-24, more than three-quarters of the women do not use any contraceptives. The proportion of non-users drops to 40.6 per cent in the age group 25-29, but it still seems high, compared with that in older age groups. Given the fact that most of the women in this group have already given birth, measures must be taken to encourage them to use contraceptives, at least for the purpose of birth spacing.

4.3.3. Current Use of Contraception by Parity

Table 4.5: DISTRIBUTION OF EVER-MARRIED WOMEN, BY NUMBER OF LIVING CHILDREN, SHAANXI,1985

ITEM	NUMBER OF LIVING CHILDREN					
	0	1	2	3	4+	TOTAL
A. ACCORDING TO CONTRACEPTIVE METHODS CURRENTLY USED						
PILL	1.2	2.5	0.7	1.2	1.5	1.4
IUD	0.9	42.0	34.7	36.9	45.8	36.6
CONDOM	0.9	3.0	1.3	1.3	0.6	1.4
VASECTOMY	0.0	0.0	4.2	5.4	3.6	3.1
TUBECTOMY	0.0	0.9	33.6	39.5	31.4	24.9
OTHERS	0.9	3.8	1.4	1.2	0.6	1.6
USERS	3.9	52.1	75.8	85.7	83.5	69.0
NON-USERS	96.1	47.9	24.2	14.3	16.5	31.0
B. ACCORDING TO DESIRE FOR NO MORE CHILDREN						
WANT NO MORE	9.8	23.3	82.4	94.9	99.3	71.3
USERS	0.6	12.3	65.8	82.5	83.1	57.5
NON-USERS	9.2	11.0	16.5	12.4	16.2	13.9
WANT MORE	90.2	76.7	17.6	5.1	0.7	28.7
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
(N)	(337)	(808)	(1009)	(840)	(1023)	(4017)
NOT STATED						(67)

Source: Calculated from the 1985 Regional In-Depth Fertility Survey data.

Table 4.5 shows the distribution of current users according to the number of living children. The pattern agrees very well with the type A curve proposed by Carrasco

(1981:18, Figure 5), which represents a strong relationship between family size and contraceptive use. The prevalence rate increases very quickly from low parity, reaches a peak of about 80 per cent at moderate parity, and then falls a little at high parity.

As seen from Table 4.5, use rate is very low at zero parity, with less than 4 per cent of women using contraceptives. Also, the methods used are reversible ones; that means the purpose for use is primarily to space the first birth. However, the majority of women (96.1 per cent) in this group do not use any contraceptives, because over 90 per cent of them want to have children. Use rate among women with one living child rises drastically from 3.9 per cent to 52.1 per cent, mainly because of the increase in IUD use. Of all eligible women in this group, 42 per cent have had IUD insertions. Nearly one-quarter (23.3 per cent) of the women are happy with their only child. This implies that the idea of the One-Child family has affected to an extent people's fertility attitudes. But for most of the women with one child (76.7 per cent), the desire for a second child is still very strong. Among them, more than one-half (51.9 per cent) use contraceptives, mainly the IUD (84.2 per cent of the users), in order to space births or wait for a second birth quota. This pattern differs from those observed in other developing countries where the pill is frequently used for birth spacing. However, the other half (48.1 per cent) of women who want more children remain non-users. For them, both the risk of getting pregnant and the probability of having another birth are very high, creating a big challenge to continuous enforcement of the One-Child Policy. It is generally believed that different methods may appear to women at different stages of their reproductive career, and the pill is a propor method before a child is desired or for spacing. The lack of widespread use of pills in the study area, as the bias in policy emphasis discussed above, probably reflects the lack of attention paid by the program to young newly-wed couples, and program efforts to prevent a second birth simply through the use of a long-term method such as the IUD. In current situation when more couples are allowed to have their second child, greater promotion of the

pill as a spacing measure might reduce the large number of non-users in their 20s, as well as the number of pregnancies among those marrying before the age of 20.

As parity goes up to two and three, use rates also increase to 75.8 per cent and 85.7 per cent, respectively. Apart from the IUD, more women begin to choose sterilization to terminate fecundity. Sterilization, including vasectomy and tubectomy, increases from less than one per cent in parity one group to 33.6 per cent in parity two group, and further to 39.5 per cent in parity three group. Since the majority of women in these two groups (82.4 per cent and 94.9 per cent, respectively) do not want any more children, contraceptives are used mainly for family size limitation. Nevertheless, since about 10 per cent of women who want no more children still do not use any form of contraception, this unmet demand should be met through further program effort. Among women with four and more children, use rate drops from the peak of 85.7 per cent to 83.5 per cent by only 2 percentage points. Family limitation still remains the purpose of contraceptive use, because almost all women in this group (99.3 per cent) want no more children. The slight drop in use rate can be explained by the fact that the women of highest parity are usually the oldest, and some of them, considering themselves approaching menopause, have given up using contraceptives.

4.4. Comparison of Survey Data with Service Statistics

Table 4.6 shows the comparison of prevalence of contraceptive practice from the 1985 survey with that from two other sources. The 1982 survey was conducted nationwide by the Chinese State Family Planning Commission, covering 310,485 women aged 15-67. Information on contraceptive use was asked for only in the case of ever-married women. Service statistics on contraceptive use are compiled from records of program acceptors by local family planning offices. Only married women in childbearing age are included.

Table 4.6: PERCENTAGE DISTRIBUTION OF EVER-MARRIED WOMEN, BY CONTRACEPTIVE METHOD, ACCORDING TO SURVEY DATA AND SERVICE STATISTICS, SHAANXI

METHOD	1982 SURVEY	1985 SURVEY	1985 SERVICE STATISTICS
PILL AND INJECTION	5.2	1.5	3.9
IUD	56.9	36.6	44.5
CONDOM	1.1	1.4	2.0
VASECTOMY	0.6	3.1	3.4
TUBECTOMY	13.8	24.9	27.9
OTHERS	3.0	1.8	0.5
TOTAL	80.6	69.0	82.2
NON-USER	19.4	31.0	17.8

Source: Calculated from the 1982 1/1000 Population Fertility Survey data (unpublished), the 1985 Regional In-Depth Fertility Survey data, and the 1985 national statistics of contraceptive service (China Population Information Centre, 1986).

As can be seen in Table 4.6, the overall level of contraceptive use is very high, according to the two survey results. However, the comparison reveals a surprising drop from 80.6 per cent in 1982 to 69 per cent in 1985. Some authors relate this change to possible demographic consequences of the economic reform and policy shifts in China (Cho,1984; Greenhalgh,1986). Recent economic reform and decentralization, particularly in rural areas, have stimulated family demand for more labour force. In addition, the One-Child Policy was relaxed in 1984, so that more couples could have their second child. These two factors reinforce each other and tend to raise fertility or at least to make it difficult to reduce fertility further. In fact, an increase in fertility has indeed been observed in these last two or three years, an alarming signal for policy-makers to make more intensive program efforts (People's Daily, 8 July 1987). In this context, the 1985 figure seems to have reflected a real decline in contraceptive use in Shaanxi. However, other reasons must be taken into consideration, too. For example, changes in age structure may also reduce contraceptive use rates, with large cohorts born in the baby-boom period of the mid-1960s added to the

denominator of married women. These newly wedded couples seldom use contraceptives. Apart from changes in age structure, differences stem even from the way the surveys were conducted. Whereas the 1982 survey covered women aged 15-67, the 1985 survey covered only those aged 15-49. Women aged 50 and above will contribute to the denominator, but a proportion of them may certainly report to have used some form of contraception. Moreover, the 1982 questionnaire does not differentiate current use from ever use. Some women may have reported their previous experiences as current ones.

It is worth noting the change with respect to specific methods. Whereas IUD users have dropped by 35.7 per cent, users of sterilization have increased by 44.6 per cent. Since women will hardly report themselves to be sterilized if they are not, the figure on sterilization is believed to be of high quality. It is reasonable to assume that the increase in sterilization use is contributed largely by former IUD users who have switched to more efficient methods.

A gap of 13.2 percentage points is also found between the 1985 survey data and the 1985 service statistics, although both sources cover the same married women aged 15-49 in the same year. Apart from possible sample error, the higher use rates recorded in the service statistics can be explained by a number of other factors. For example, the survey only includes current use at the time of interview, while service statistics refer to records of the whole year. In other situations, a woman who accepted a method but died, moved to another province, or reached age 50 before the survey would be excluded from the survey, but still recorded in the service statistics. Moreover, there are also duplication problems, particularly in the case of the pill and condom. Occasionally, there have been reports that service records are artificially inflated by local bureaucrats in order to meet plan targets. However, this difference should not be great. Generally speaking, survey data tend to be more accurate than service statistics.

According to the service statistics, prevalence rates of all program methods are higher than in survey data. The lower prevalence of non-program or traditional methods is understandable, since they are outside the service record system. The difference in the IUD case seems a bit too large, and deserves further explanation. However, the two sources yield similar findings: that the use rates in Shaanxi are very high, and the IUD and sterilization are the most popular methods used.

4.5. Differentials in Contraceptive Use by Education

In respect of differentials in contraceptive use, the educational attainment of women is one of the most discussed socio-economic variables. Many WFS studies have revealed a strong positive relationship between use rate and women's level of education (Cleland et al. 1979; Freedman, 1981; Immerwahr, 1981; Peng,1981). In a cross-country study based on WFS data, Brakett et al. (1978) have not only confirmed the assumption that better educated women are more likely to use contraception than less educated women, but also found that differences in use rate by education are much larger in countries with weak programs than in those with strong programs. For example, in Korea, the use rate among women

Table 4.7: PROPORTION OF CURRENT USERS AMONG EVER-MARRIED WOMEN, BY AGE AND EDUCATION, SHAANXI, 1985 (per cent)

AGE GROUP	LEVEL OF EDUCATION		
	NONE	PRIMARY	SECONDARY AND OVER
15-19	9.1	6.3	14.3
20-24	38.7	35.4	32.2
25-29	77.3	72.3	70.9
30-34	93.7	94.8	91.0
35-39	93.1	96.5	95.9
40-44	87.7	91.5	85.4
45-49	70.7	75.5	82.8
USERS	82.2	83.6	71.5
NON-USERS	17.8	16.4	28.5
TOTAL	100.0	100.0	100.0
(N)	(1328)	(1075)	(853)

Source: Calculated from the 1985 Regional In-Depth Fertility Survey data.

with secondary education is 8.9 per cent higher than that among illiterate women, while in Nepal, the corresponding figure rises to 15.3 times.

Surprisingly, the situation is quite different in Shaanxi. The figures in Table 4.7 indicate that women with primary education have the top use rate of 83.6 per cent, followed by women with no education at 82.2 per cent. In contrast, among women with the highest education (secondary and over) only 71.5 per cent are using contraception. However, this pattern does not necessarily hold within each age group. In younger age groups, except for the teen age group, use rates are the highest among the illiterates. As age increases, more women with primary education start to use contraception. Only in the oldest age group does the pattern agree with the conventional one observed in other developing countries, with women with the highest education most frequently practicing contraception. In general, contraceptive use increases with age, and only decreases to some extent in older age groups. Of all women interviewed, those aged 35-39 have the highest use rates (around 95 per cent), regardless of their educational background.

This unique pattern of contraceptive use in China has also been documented in other studies. In their analysis of the 1982 fertility data, Qiu et al.(1984) conclude that the educational difference between the women who received a college education and the illiterates is not statistically significant. Yang (1986) found that for women with two or more children in Anhui Province the differences in use by education almost disappear. For this situation the only explanation is that China's family planning program is so strong and intensive that it has almost eliminated the expected differentials in contraceptive use. One of the effective measures used to ensure program achievement is the mass information and persuasion campaigns with special emphasis on rural and uneducated population. China's success, as illustrated here in the case of Shaanxi, strongly supports the argument that family planning programs

can help promote contraceptive use and hence reduce fertility even in countries with a low level of socio-economic development.

4.6. Conclusion

The 1985 Regional In-Depth Fertility Survey results discussed above show that the family planning program in Shaanxi, as indicated by contraceptive knowledge and use, is very successful. Contraceptive knowledge is nearly universal, with each married woman in reproductive age knowing 5.2 methods of contraception on average, while contraceptive use is quite widespread, with 69 per cent of married women in reproductive age using some form of contraception. About three-quarters (71.3 per cent) of married women state a desire for no more children.

A strong relationship has been confirmed between contraceptive use and age and family size. Women at intermediate and older ages and women with a large number of living children are more likely to use contraception. The methods frequently used are overwhelmingly those offered by the program. About 89.1 per cent of all contraceptive users choose more efficient and long-term methods - the IUD and sterilization. However, suggestion has been made to pay more attention to the pill use.

The conventional positive relationship between contraceptive use and educational attainment does not exist in Shaanxi, suggesting that the program has had a significant effect. Given data limitations, other relevant socio-economic variables, such as rural-urban residence, occupation and standard of living, have not been considered in this chapter. In terms of differentials in contraceptive use, however, these background characteristics of respondents deserve further research.

The findings also reveal that of women with one living child over three-quarters (76.7 per cent) still want more children, and nearly one-half (48.1) of them do not use any form of contraception. Measures have to be adopted and

directed especially at this group of women, if the government intends to maintain its One-Child Policy. Moreover, potential demand for contraceptive services has been found among women who want no more children but who do not use contraceptives.

Chapter 5: ASSESSING PROGRAM IMPACT ON FERTILITY

5.1. Introduction

As mentioned in Chapter 2, large-scale family planning programs have been adopted since the 1960s by governments of most developing countries in an attempt to reduce fertility and improve the welfare of the population as a whole. A huge amount of government resources and international funds has been employed to support these programs. With the rapid growth of national family planning programs, policy-makers are increasingly concerned about program results. In response, demographers and statisticians have developed a variety of techniques to evaluate program performance. Program evaluation is not limited to finding out whether the objectives have been achieved. The demographic data about future population trends can provide important information for the formulation of policies with respect to manpower, health, education. Being an extensive social undertaking, the family planning program involves not only different social and economic policies, but also different academic disciplines.

As far as demographic evaluation is concerned, early research focused primarily on the measurement of family planning knowledge, attitudes and practices in the target population, on counting and describing family planning acceptors, on setting acceptor targets, and on measurement of the duration and effectiveness of contraceptive use. Since the 1970s, efforts have been made to develop techniques for evaluating the impact of family planning programs on fertility. A 1979 U.N. publication (U.N., 1979) describes detailed procedures of eight evaluation techniques: standardization approach, standard couple-years of protection, component projection approach I and II, analysis of reproductive process, multivariate areal analysis, simulation, and experimental design. In recent

years, new techniques and models have been proposed continuously, such as the index of contraceptive effectiveness (Laing,1982) and the prevalence model (Bongaarts,1985).

Most techniques assess the impact of family planning programs on fertility by comparing, based on certain assumptions, the actual fertility of a particular population with the fertility that population would have experienced had the program not existed. This synthetic fertility, referred to as "potential fertility", remains a crucial variable in evaluation procedures. Except in a few cases where fertility rate and fertility ratio are used, the most widely used measure of program impact is the number of births averted by a program in a given year. This estimate is obtained by subtracting actual fertility from potential fertility, and then multiplied by the appropriate population base.

Potential fertility of a general population can be divided further into two categories: natural potential fertility and net potential fertility. Natural potential fertility is the fertility level that would be observed when any form of birth control is absent. Net potential fertility is the fertility level if a program had never existed. In this case, only non-program contraception would play an important role. A variety of techniques and approaches is used to estimate the potential fertility and numbers of births averted. However, given different assumptions, the results are not always consistent or comparable with each other.

Measuring the program impact on fertility is recognized as a difficult task. Inaccurate data always remain the major problem. Also, selection of a proper technique or a set of input data will strongly affect final results. Another problem emerges from the accountability of results. If a decline in fertility is observed, how much of it can be attributed to the program and how much would have happened anyway? As to the efficiency of the various evaluation techniques, there is no general agreement even among

demographers themselves. In order to shed more light on the topic, three methods have been chosen in this chapter to assess the impact of family planning programs on fertility in Shaanxi.

5.2. Standardization Approach

5.2.1 Methodology

In demography, standardization is usually used as a method for comparing demographic occurrences between two populations, in order to examine different compositional characteristics that may play a role in the observed levels of these occurrences. In recent years, it has also been employed to assess changes in demographic variables at two points in time for a single population. In program evaluation, the purpose is to decompose an observed change in fertility (crude birth rate or general fertility rate) into such demographic components as age structure and marital structure of women of reproductive ages, marital fertility, and a proportion of women of reproductive ages in the total population. Therefore, standardization is sometimes referred to as a decomposition approach. Some authors suggest that standardization should be the first step in assessing the demographic impact of family planning programs, in order to establish whether a program-related decline in fertility did indeed occur (Nortman, 1985).

The standardization decomposition is based on the following equation, which describes the relationship of crude birth rate (or general fertility rate) with the other four factors:

$$CBR = GFR \times W/P = [\Sigma(Ai \times Mi \times Fi)]W/P$$

where: CBR = crude birth rate;
GFR = general fertility rate;
W/P = proportion of female population of reproductive ages (15-49) in total population;
i = age group;

Ai = age distribution of females of reproductive ages;
Mi = proportion of married women in each five-year age group;
Fi = marital fertility rates in each five-year age group.

The change in the crude birth rate can be expressed as a function of the changes occurring in four components:

$$CBR = GFR \times W/P + W/P[\Sigma(Ai \times Mi \times Fi) + \Sigma(Ai \times Mi \times Fi) + \Sigma(Ai \times Mi \times Fi)];$$

where: CBR = change in crude birth rate;
W/P = change in proportion of female population;
Ai = change in age distribution;
Mi = change in marital structure;
Fi = change in marital fertility.

In addition, the following major assumptions have been made in the standardization procedure:
(1) The four components of the crude birth rate can be legitimately added/subtracted in order to assess the individual effect of each component.
(2) Each component of the crude birth rate is functionally independent, in order to avoid overlapping effects. Interaction factors are not allowed for here.
(3) Other factors that may effect fertility, such as changes in social-economic and biological characteristics, remain constant during the study period.

5.2.2. Basic Data

The period chosen for the application of the standardization approach is 1972-1984, with 1972 taken as the base year. As mentioned in Chapter 1, 1972 is the year when China's third birth control campaign started. Basic data used for decomposition of the crude birth rate are presented in Table 5.1 and Table 5.2. Crude birth rates of 34.1 per thousand in 1972 and 20.7 per thousand in 1984 are selected for decomposition purposes. The absolute difference is 13.4 per thousand.

Table 5.1. DATA USED IN STANDARDIZATION, SHAANXI, 1972

AGE GROUP	NUMBER OF WOMEN IN COHORT (1000) W1i	AGE DISTRIBUTION (/100) A1i	NUMBER OF MARRIED WOMEN (1000) N1i	PROPORTION MARRIED (/100) M1i	ASMFR# (/1000) F1i	NUMBER OF BIRTHS (1000)
15-19	1,285	23.9	142	11.0	399	56.5
20-24	1,010	18.8	690	68.3	386	267.7
25-29	819	15.2	792	96.7	320	253.9
30-34	719	13.4	710	98.7	218	156.0
35-39	632	11.8	631	99.8	134	86.0
40-44	479	8.9	478	99.8	75	36.9
45-49	429	8.0	428	99.8	6	2.6
15-49	5,373	100.0	3,870			859.5

Total mid-year population:	P1 = 25,230,000
Proportion of women aged 15-49:	W1/P1 = 0.2130
General fertility rate:	GFR = 0.1598
Crude birth rate:	CBR = 0.0341

Source: Calculated from Shaanxi provincial Bureau of Statistics, 1986, and the 1985 Regional In-Depth Fertility Survey Data.

Note #: ASMFR = age-specific marital fertility rate.

Table 5.2. DATA USED IN STANDARDIZATION, SHAANXI, 1984

AGE GROUP	NUMBER OF WOMEN IN COHORT (1000) W2i	AGE DISTRIBUTION (/100) A2i	NUMBER OF MARRIED WOMEN (1000) N2i	PROPORTION MARRIED (/100) M2i	ASMFR# (/1000) F2i	NUMBER OF BIRTHS (1000)
15-19	1,702	21.6	70	4.1	390	27.2
20-24	1,473	18.7	813	55.2	357	291.6
25-29	1,267	16.1	1,220	96.3	169	206.5
30-34	1,116	14.2	1,114	99.8	61	68.1
35-39	891	11.3	888	99.7	15	13.4
40-44	754	9.6	752	99.8	3	2.3
45-49	660	8.4	659	99.8	1	0.6
15-49	7,863	100.0	5,516			609.8

Total mid-year population:	P2 = 29,485,000
Proportion of women aged 15-49:	W2/P2 = 0.2666
General fertility rate:	GFR = 0.0775
Crude birth rate:	CBR = 0.0207

Source: Calculated from Shaanxi Provincial Bureau of Statistics, 1986, and the 1985 Regional In-Depth Fertility Survey Data.

Note #: ASMFR = age-specific marital fertility rate.

5.2.3. Consistency Test

Before decomposing the crude birth rate, a consistency test is required to determine whether there is compatibility between the crude birth rate and its four components. That means women of various reproductive ages under standardization must be drawn from the same population represented in the denominator of the crude birth rate. The consistency test is based on the equation E.1 given above. According to the test results (shown in Table 5.3 for 1972 and in Table 5.4 for 1984), the crude birth rates derived from their components are slightly lower and those derived from input data. But the difference is well within the acceptable range.

Table 5.3. CONSISTENCY TEST, SHAANXI, 1972

AGE GROUP	AGE DISTRIBUTION (/100) Ali	PROPORTION MARRIED (/100) Mli	ASMFR (/1000) Fli	AlixMlixFli (/1000)
15-19	23.9	11.0	399	10.5279
20-24	18.8	68.3	386	49.5639
25-29	15.2	96.7	320	47.0252
30-34	13.4	98.7	218	28.8381
35-39	11.8	99.8	134	15.7804
40-44	8.9	99.8	75	6.6617
45-49	8.0	99.8	6	0.4790
15-49	100.0			158.8761

GFR = AlixMlixFli = 0.1589
CBR = GFRxWl/Pl = 0.0334
Observed CBR: 0.0341
Difference: 0.0007

Source: Table 5.1.

Table 5.4. CONSISTENCY TEST, SHAANXI, 1984

AGE GROUP	AGE DISTRIBUTION (/100) A2i	PROPORTION MARRIED (/100) M2i	ASMFR (/1000) F2i	A2ixM2ixF2i (/1000)
15-19	21.6	4.1	390	3.4538
20-24	18.7	55.2	357	36.8510
25-29	16.1	96.3	169	26.2023
30-34	14.2	99.8	61	8.6447
35-39	11.3	99.7	15	1.6899
40-44	9.6	99.8	3	0.2874
45-49	8.4	99.8	1	0.0838
15-49	100.0			77.2129

GFR = A1ixM1ixF1i = 0.0772
CBR = GFRxW1/P1 = 0.0205
Observed CBR: 0.0207
Difference: 0.0002

Source: Table 5.2.

5.2.4. Effect of Change in Age Structure

The effect of change in the age structure of the females aged 15-49 during the period 1972-1984 on changes in the crude birth rate during the same period is estimated as follows:

$$\text{Change in CBR} = \Sigma[(A2i-A1i)xM1ixF1i]W1/P1$$

Table 5.5. COMPUTATION OF ROLE OF AGE STRUCTURE IN CHANGES IN CRUDE BIRTH RATE, SHAANXI, (base population 1972)

AGE GROUP	1972 AGE STRUCTURE (/100) A1i	1984 AGE STRUCTURE (/100) A2i	DIFFERENCE (/100) A2i-A1i	MARITAL STATUS (/100) M1i	ASMFR (/1000) F1i	CHANGE IN GFR (/1000)
15-19	23.9	21.6	-2.3	11.0	399	-1.01
20-24	18.8	18.7	-0.1	68.3	386	-0.26
25-29	15.2	16.1	0.9	96.7	320	2.78
30-34	13.4	14.2	0.8	98.7	218	1.72
35-39	11.8	11.3	-0.5	99.8	134	-0.67
40-44	8.9	9.6	0.7	99.8	75	0.52
45-49	8.0	8.4	0.4	99.8	6	0.02
15-49	100.0	100.0				3.11

Change in GFR = Σ[(A2i-A1i)xM1ixF1i] = 0.00311
Change in CBR = GFRxW1/P1 = 0.00311x0.213 = 0.00066

Source: Table 5.1 and Table 5.2.

After substituting values of all required variables (see Table 5.5), it is found that the proportion of women in the most fertile age groups (25-34) has increased. As a result of this change, the crude birth rate would have risen by 0.66 per thousand, had the marital status distribution, marital fertility and the proportion of female population aged 15-49 in total population remained constant at the 1972 level.

5.2.5. Effect of Change in Marital Status Distribution

The effect of change in the marital status structure of the females aged 15-49 during the period 1972-1984 on changes in the crude birth rate during the same period is estimated as follows:

$$\text{Change in CBR} = \sum[A1i(M2i-M1i)F1i]W1/P1$$

Table 5.6. COMPUTATION OF ROLE OF MARITAL STATUS STRUCTURE IN CHANGES IN CRUDE BIRTH RATE, SHAANXI, (base population 1972)

AGE GROUP	MARITAL STRUCTURE 1972 (/100) M1i	MARITAL STRUCTURE 1984 (/100) M2i	DIFFERENCE (/100) M2i-M1i	AGE STRUCTURE (/100) A1i	ASMFR (/1000) F1i	CHANGE IN GFR (/1000)
15-19	11.0	4.1	-6.94	23.9	399	-6.62
20-24	68.3	55.2	-13.10	18.8	386	-9.51
25-29	96.7	96.3	-0.38	15.2	320	-0.18
30-34	98.7	99.8	1.08	13.4	218	0.32
35-39	99.8	99.7	-0.10	11.8	134	-0.02
40-44	99.8	99.8	0.00	8.9	75	0.00
45-49	99.8	99.8	0.00	8.0	6	0.00
15-49				100.0		-16.01

Change in GFR $=\sum[A1i(M2i-M1i)F1i] = -0.016$
Change in CBR $= GFR \times W1/P1 = -0.016 \times 0.213 = -0.0034$

Source: Table 5.1 and Table 5.2.

After substituting values for all required variables (see Table 5.6), a drop in the proportion married becomes evident in younger age groups (aged 15-29). As a result of this change, the crude birth rate would have decreased by 3.4 per thousand, had the age structure, marital fertility

and the proportion of female population aged 15-49 in the total population remained constant at the 1972 level.

5.2.6. Effect of Change in Marital Fertility

The effect of change in the marital fertility of the females aged 15-49 during the period 1972-1984 on changes in the crude birth rate during the same period is estimated as follows:

$$\text{Change in CBR} = \sum[A1ixM1i(F2i-F1i)]W1/P1$$

After substituting values for all required variables (see Table 5.7), decreases in marital fertility have been revealed in all age groups. The drop is particularly remarkable in age groups 25-39. For example, the 1984 fertility of age group 30-34 is about one-third of that of 1972, while the 1984 fertility of age group 35-39 is only 11 per cent of that of 1972. As a result of this change, the crude birth rate would have been reduced by 14.4 per thousand, had the age structure, marital status structure and the proportion of female population aged 15-49 in the total population remained constant at the 1972 level.

Table 5.7. COMPUTATION OF ROLE OF MARITAL FERTILITY IN CHANGES IN CRUDE BIRTH RATE, SHAANXI, (base population 1972)

AGE GROUP	MARITAL FERTILITY 1972 (/1000) F1i	MARITAL FERTILITY 1984 (/1000) F2i	DIFFERENCE (/1000) F2i-F1i	MARITAL STRUCTURE (/100) M1i	AGE STRUCTURE (/100) A1i	CHANGE IN GFR (/1000)
15-19	399	390	-9	11.0	23.9	-0.24
20-24	386	359	-27	68.3	18.8	-3.47
25-29	320	169	-151	96.7	15.2	-22.19
30-34	218	61	-157	98.7	13.4	-20.77
35-39	134	15	-119	99.8	11.8	-14.01
40-44	75	3	-72	99.8	8.9	-6.40
45-49	6	1	-5	99.8	8.0	-0.40
15-49					100.0	-67.47

Change in GFR = $\sum$[A1ixM1i(F2i-F1i)] = -0.06747
Change in CBR = GFRxW1/P1 = -0.06747x0.213 = -0.0143

Source: Table 5.1 and Table 5.2.

5.2.7. Effect of Change in Proportion of Female Population in Relation to Total Population

The effect of change in the proportion of the female population of reproductive ages during the period 1972-1984 on changes in crude birth rate during the same period is estimated as follows:

$$\text{Change in CBR} = GFR1(W2/P2 - W1/P1)$$
$$= 0.1598x(0.266 - 0.213) = 0.0085$$

Substitution of the values for all required variables shows that as a result of changes in the proportion of the women in total population, the crude birth rate would have increased by 8.5 per thousand, had the age structure, marital status structure and marital fertility remained constant at the 1972 level.

5.2.8. Analysis and Interpretation of Results

Based on the results obtained above, the independent contribution of each of the four factors is listed in Table 5.8. Both the age structure and the proportion of women aged 15-49 in the total population have positive effects and would have pushed up the crude birth rate by 9.2 per thousand during the study period. The reason is that the large cohorts born in the baby-boom of the 1960s are entering childbearing ages. Even if the cohort fertility itself is controlled, the crude birth rate as an aggregate measurement will rise in certain periods. On the other hand, both marital status structure and marital fertility have negative effects and would help reduce fertility. Changes in marital status structure are clearly the consequence of the late marriage campaign introduced in the late 1970s. The most striking change comes from marital fertility, with the crude birth rate dropping by 14.4 per thousand, an even larger decline than the overall decline of 13.4 per thousand. As in most cases of standardization, the sum of the above discussed four variables cannot explain completely the observed change in crude birth rate. It is assumed that

the joint effects of the four individual variables would have been responsible for the residual terms.

The final step in the standardization approach is to estimate the number of births averted by changes in the crude birth rate. It is assumed that the crude birth rate of 1984 remains constant at the 1972 level of 34.1 per thousand. Application of this hypothetical crude birth rate to the mid-1984 population (29.49 million) yields the hypothetical number of births for 1984 (1,005,440). The difference between this hypothetical number of births and the actual number of births (609,800) is the hypothetical number of births averted during 1984 (395,640). Table 4.8 also shows the number of births averted accounted for by each of the four components.

Table 5.8. CHANGES IN CRUDE BIRTH RATE, 1972-1984, AND HYPOTHETICAL NUMBER OF BIRTHS AVERTED, 1984, SHAANXI, (base population 1972)

CHANGING COMPONENTS	ABSOLUTE CHANGE (/1000)	HYPOTHETICAL BIRTHS AVERTED
Age structure	0.7	19,460
Marital status	-3.4	-100,370
Marital fertility	-14.4	-425,150
Proportion of women aged 15-49 in total population	8.5	250,950
Total change observed	-13.4	

Source: Table 5.5, Table 5.6 and Table 5.7.

In order to identify the program impact, we are more interested in the number of births averted by the change in marital fertility. As can be seen in Table 5.8, 425,150 births averted would be attributed to the independent effect of fertility change within marriage. Two major factors appeared to be responsible for this change: contraceptive use and abortion. In China abortion is legal and tolerated, and sometimes used as a back-up measure when contraception fails. According to the 1985 Regional In-Depth Fertility Survey, the ratio between live births and abortion in Shaanxi during the period 1980-1985 was 4.87:1. It can be

assumed that 17 per cent of all pregnancies were aborted. However, this ratio is only an approximation to the reality. Given the fact that the survey was based on respondents' own retrospective reports, rather than more accurate clinical records, abortion incidence tended to be underreported. People are still reluctant to talk about this topic in public, particularly in the rural areas. According to a research on induced abortion in Xi'an City, the capital of Shaanxi Province (Feng and Chen,1983), the abortion/pregnancy ration was 23 per cent in 1981, 6 percentage points higher than the survey result. Apart from effects of misreporting, this difference can be explained by the fact that women in urban areas are usually less reluctant to use abortion when they think necessary, and they can also have easier access to facilities. For the discussion in this section, the survey ratio of 17 per cent is applied to the total marital fertility change. The resulting 72,360 births are believed to have been averted by abortion and 352,790 by program contraception. The latter figure is about 58 per cent of the actual births in 1984.

5.2.9. An Alternative Decomposition Method

The basic principle of the standardization approach is to examine the effect of a varying component, while keeping others constant. When applying it to birth rate analysis, many authors notice that the sum of individual contributions generally does not equal the total observed change. There always remains a proportion that cannot be explained satisfactorily. Therefore, Kitagawa (1955) has suggested an alternative method of decomposition to avoid residual terms.

This method is based on the following equation, which describes the relationship of change in crude birth rate with three other components: the first parameter indicating changes in age-sex structure, the second parameter indicating changes in marital status structure within age groups, and the third parameter indicating changes in fertility within age-marital status groups.

$$CBR = d(FaKa) + d(KaFamKam) + d(KaKamFam);$$

where: CBR = change in crude birth rate;
Ka = change in proportion of females aged a to a+5 in total population;
Kam = change in proportion of females of marital status m in the ath age group;
Fam = change in age-marital status-specific fertility for females of marital status m in age group a to a+5;
Fa = KamFam = average age-specific fertility over the study period;
Ka = average over the study period;
Kam = average over the study period;
Fam = average over the study period;

In applying the above decomposition method, the same data is used as in the standardization approach. The result is shown in Table 5.9.

Table 5.9. DECOMPOSITION OF THE CHANGE IN THE CRUDE BIRTH RATE, SHAANXI, 1972-1984

AGE GROUP	CHANGE IN CBR (/1000)	CHANGE IN PERCENTAGE (/100)	CONTRIBUTION FROM CHANGES IN: AGE-SEX STRUCTURE (/1000)	MARITAL STRUCTURE (/1000)	MARITAL FERTILITY (/1000)
15-19	-1.3	-9.7	0.2	-1.5	0.0
20-24	-0.7	-5.2	2.3	-2.2	-0.8
25-29	-3.1	-23.1	2.5	0.0	-5.6
30-34	-3.9	-29.1	1.3	0.1	-5.3
35-39	-2.9	-21.6	0.4	0.0	-3.3
40-44	-1.4	-10.5	0.3	0.0	-1.7
45-49	-0.1	-0.8	0.0	0.0	-0.1
15-49	-13.4	-100.0	7.0	-3.6	-16.8

Source: Calculated from Table 5.1 and Table 5.2.

During the study period, the absolute change in crude birth rate is -13.4 per thousand, the same as the result of standardization. It is interesting to note that nearly three-quarters of the change takes place in the three age groups from 25-29 to 35-39, and about one-third of it in the age group 30-34. Here the contribution of change in age-sex structure is still positive, and includes the change in the proportion of women aged 15-49 in the total population,

which has been considered separately in the standardization approach. Contributions by the other two variables - marital status structure and marital fertility - are negative, and slightly higher than those derived from standardization. Marital status change influences primarily younger age groups, reflecting the effect of postponed marriage. In contrast, marital fertility change is concentrated mainly in older age groups, as a result of deliberate birth control. Its effect is so strong that it not only outweighs the effects of the other two variables (change in maternal fertility would have itself reduced the crude birth rate by 16.5 per thousand), but also shapes the overall decline in crude birth rate as discussed above. Converted into number of births averted, a total of 487,170 may be attributed to the marital fertility change. Again, if the impact of abortion is excluded, the remaining 404,350 would have been averted by program efforts.

5.3. Component Projection Approach II

Component projection approach II (U.N., 1979) is a less sophisticated model compared with the computerized model of component projection approach I. But when data of high quality are not available, it is still a very useful method to assess the impact of family planning programs on fertility.

5.3.1. Methodology

Originally proposed by Lee and Isbister (1966), this method uses service statistics to estimate the number of births averted in year t. Since there is a nine-month interval between conception and birth, the computation must take into account all effective users of contraception from 1 April of year t-1 to 1 April of year t. For simplicity, users of 1 October of year t-1 represent the average number of users during the one-year period. Estimates of births averted are made separately for each contraceptive method. The basic equation for calculation is as follows:

$$Ni = Qit \times gi$$

where: Ni = number of births averted by women in each age group i;

Qit = number of women in the ith age group in year t who are practicing effective contraception during the period from 1 April of year t-1 to 1 April of year t;

gi = estimate of potential fertility of women Qit.

For estimating Qit and gi, major assumptions have been made as follows:

(1) Prevalence level of contraception is represented by that of program acceptors.

(2) Acceptors are evenly distributed among all ages within age groups, and the acceptance rate remains constant throughout each year of the program;

(3) Effects of ageing, mortality and changes in other socio-economic variables are negligible.

5.3.2. Basic Data

Family planning service statistics on new acceptors of IUD, sterilization, pills, condom and other conventional methods are used to estimate births averted in 1984. Data on IUD and sterilization cover the period 1981-1983, while data on other methods are only for 1983 (see Table 5.10). In order to meet computation requirements, supplementary data have to be borrowed from other sources.

Table 5.10. NEW ACCEPTORS OF CONTRACEPTIVES, BY METHOD, SHAANXI, 1981-1983

METHOD	1981	1982	1983
Pill			116,739
IUD	325,873	408,824	412,388
Condom			67,319
Tubectomy	235,573	264,600	294,858
Vasectomy	20,536	29,724	32,417
Others			45,129

Source: China Population Information Centre, 1982, 1983, and 1984.

Table 5.11. PERCENTAGE AGE DISTRIBUTION OF USERS, BY METHOD SHAANXI, 1982

METHOD	20-24	25-29	30-34	35-39	40-44	45-49
Pill	6.8	34.2	17.9	16.2	15.8	8.9
IUD	8.1	29.0	25.3	18.1	13.1	6.3
Condom	6.0	18.0	20.0	22.0	20.0	14.0
Tubectomy	0.5	12.6	25.8	27.9	22.5	10.8
Vasectomy	7.7	11.5	19.2	23.1	23.1	15.4
Others	10.7	18.6	12.9	12.8	25.0	20.0

Source: Calculated from the 1982 1/1000 Population Fertility Survey Data (unpublished).

According to the formula (Ni = Qit x gi), calculations of Qit and gi are two important steps for estimating births averted. Since service statistics do not provide information on age specific contraceptive use, Qit has to be estimated by the age distribution of users obtained from the 1982 fertility survey (see Table 5.11). With regard to gi, the marital fertility schedule of 1972 is taken as potential fertility (see Table 5.1, column ASMFR). As mentioned in Chapter 1, 1972 is the year when China's third birth control campaign was introduced.

5.3.3. Births Averted by the IUD

It is evident in almost all service statistics and service data that of all methods, the IUD is the most frequently used in China (Chen,1984; Poston,1986). In 1985, 2,158,671 married women in Shaanxi used the IUD, making up 54.1 per cent of all contraceptive users (China Population

Information Centre, 1986). The service data on the IUD provided in Table 5.10 are converted into users by age group (Appendix,A.1), using the age specific pattern in Table 5.11. Effective users as of 1 October 1983 (Qit in Appendix, A.3) are derived from continuation rates (Appendix, A.2) borrowed from Manual IX (U.N.,1979:68, Table 62), and adjusted by the age progression formula (U.N.,1979:64), assuming that in each year one-fifth of women pass on to the next age group:

$$Qi^{1983} = 0.925_{qi}{}^{1982} + 0.075_{qi-1}{}^{1982} + 0.75_{qi}{}^{1981} + 0.25_{qi-1}{}^{1981}$$

The last step is to obtain estimated number of births averted (see Table 5.12) by applying the potential fertility gi to the effective users in each age group Qit.

Table 5.12. NUMBER OF BIRTHS AVERTED BY THE IUD, BY AGE AND YEAR OF INSERTION, SHAANXI, 1984

AGE GROUP	ASMFR 1972 gi	BIRTHS AVERTED BY YEAR OF INSERTION 1981	1982	1983	TOTAL BIRTHS AVERTED	PERCENTAGE (/100)
20-24	0.335	3,111	6,519	9,590	19,220	10.9
25-29	0.314	12,862	23,988	33,022	69,873	39.8
30-34	0.217	12,218	18,246	21,213	51,677	29.4
35-39	0.136	6,050	8,669	9,686	24,405	13.9
40-44	0.077	2,464	3,539	3,964	9,968	5.7
45-49	0.006	117	154	156	427	0.2
20-49		36,823	61,115	77,631	175,569	100.0

Source: Table 5.1 and Appendix A.3.

The results show that in 1984 175,569 births would have been averted through IUD use, with the highest concentration in age group 25-29. Nearly three-quarters of all births averted are concentrated in the age groups 25-34. This finding is identical with other studies that IUD use is more popular at younger ages (Chen,1984; Poston, 1986), when women have not yet decided to terminate childbearing completely.

5.3.4. Births Averted by Sterilization

Sterilization, particularly female sterilization, is the second most popular method of contraception in China. In 1983, there were 1,177,865 users of tubectomy and 148,622 users of vasectomy in Shaanxi, together accounting for 36.8 per cent of all contraceptive users. During the climax of the One-Child Campaign in the early 1980s, sterilization as a long-term, highly efficient method was strongly encouraged by local governments, with special emphasis on women who have more than two children. However, in recent years, the sterilization rate has dropped a little as more women switched to reversible methods (Chen and Kols,1982; Greenhalgh, 1986). For the purpose of simplicity, the service data on tubectomy and vasectomy provided in Table 5.10 are added together and converted into users by age group (Appendix A.4), using the age-specific pattern in Table 5.11. Effective users as of 1 October 1983 (survivors of sterilization acceptors after n months, Appendix, A.6) are derived using the five-year survival ratio (Appendix, A.5), and the age progressing formula mentioned in section 5.3.3. The number of births averted (see Table 5.13) is obtained by applying potential fertility gi to the effective users in each age group Qit.

Table 5.13. NUMBER OF BIRTHS AVERTED BY STERILIZATION, BY AGE AND YEAR OF OPERATION, SHAANXI, 1984

AGE GROUP	ASMFR 1972 gi	BIRTHS AVERTED BY YEAR OF STERILIZATION 1981	1982	1983	TOTAL BIRTHS AVERTED	PERCENTAGE (/100)
20-24	0.335	508	907	1,230	2,644	2.2
25-29	0.314	5,867	8,865	11,876	26,607	22.2
30-34	0.217	10,772	13,973	17,161	41,905	35.0
35-39	0.136	9,152	10,689	12,110	31,952	26.7
40-44	0.077	4,819	5,342	5,761	15,922	13.3
45-49	0.006	245	245	236	726	0.6
20-49		31,362	40,020	48,374	119,757	100.0

Source: Table 5.1 and Appendix A.6.

The results show that about 119,757 births would have been averted by sterilization in 1984, with the highest

concentration in the age group 30-34. Unlike the IUD, sterilization is a method that older women tend to choose.

5.3.5. Births Averted by the Pill, the Condom and Other Contraceptives

Compared with other developing countries, the prevalence of the pill, the condom and other conventional contraceptives is relatively low in China. The conventional contraceptives in this study include spermicides, diaphragm, rhythms and withdrawal. In 1983, of all contraceptive users in Shaanxi, only 3.2 per cent used pills, 1.9 per cent used condoms, and 1.2 per cent used other contraceptives. Given the fact that data for only one year are available and the continuation rates of these methods are not high, the procedure to estimate number of births averted has to be further simplified, assuming that all users are new acceptors in 1983. Furthermore, no attempt has been made to adjust the data to 1 October 1983. The service data provided in Table 5.10 are first converted into users by age group (Appendix, A.7) by using the age specific pattern in Table 5.11, and then into effective users (Appendix, A.8) according to proportion fecund and the effectiveness rate of the contraceptives. The number of births averted by these methods is obtained by applying the potential fertility gi to the effective users in each age group Qit, as shown in Table 5.14.

Table 5.14. NUMBER OF BIRTHS AVERTED BY PILL, CONDOM AND OTHER CONTRACEPTIVES, BY AGE, SHAANXI,1984

AGE GROUP	ASMFR 1972 gi	BIRTHS AVERTED BY METHOD			TOTAL BIRTHS AVERTED	PERCENTAGE (/100)
		PILL	CONDOM	OTHERS		
20-24	0.335	2,549	995	1,110	4,653	13.9
25-29	0.314	11,552	2,768	1,790	16,110	48.1
30-34	0.217	4,135	2,104	849	7,088	21.2
35-39	0.136	2,121	1,344	489	3,955	11.8
40-44	0.077	570	583	456	1,609	4.8
45-49	0.006	28	20	18	67	0.2
20-49		20,956	7,814	4,712	33,482	100.0

Source: Table 5.1 and Appendix A.8.

The results show that in 1984 an estimated 33,482 births would have been averted by the pill, the condom and other contraceptives, with nearly one-half being concentrated in the age group 25-29. Thus, these reversible methods play a very important role in reducing the fertility of women at younger ages.

5.3.6. Overall Impact of Contraceptive Use

Table 5.15 shows the overall impact of contraceptive use discussed above. In 1984, about 328,806 births would have been averted among program acceptors in Shaanxi who entered the program during 1981-1983, if the fertility remained constant at the 1972 level. This finding is close to the estimate of 352,790 births derived from the standardization approach. In terms of age distribution, nearly 65 per cent of these births were avoided by women in the age group 25-34. As discussed in the standardization approach, the fertility decline in these most fertile age groups has strongly shaped the overall fertility changes. In comparison, fertility decline in the youngest age group is not particularly remarkable. As observed, younger women with lower parity tend to choose reversible contraceptive methods just for timing or spacing of childbearing, instead of terminating childbearing. With regard to methods used, about 90 per cent of births were averted by the IUD and sterilization. This indicates that the government policy of emphasizing long-term, highly effective methods is very successful.

Compared with their proportion in contraceptive prevalence (6.3 per cent), the proportion of births averted by pills, condoms and other contraceptives (10.2 per cent) seems large. It can be explained in two ways: either the use of pills, condoms and other contraceptives has been over.reported (see the assumption in the previous section that all users of the pill, the condom and other contraceptives are to be new acceptors in one year), or the use of the IUD and sterilization has been underreported. As far as the latter reason is concerned, data limitation is

obviously responsible for bias. On the one hand, the age group 15-19 has been excluded from the calculation. On the other hand, the contribution of users who entered the program before 1981 has also been neglected. Given the fact that continuation rates for IUD and sterilization are normally higher than other contraceptives, this bias may well explain why there is a gap of 9,000 births averted between the estimates derived from the standardization and those derived by the component projection approach II.

Table 5.15. NUMBER OF BIRTHS AVERTED BY CONTRACEPTIVE USE, BY AGE AND METHOD, SHAANXI, 1984

AGE GROUP	BIRTHS AVERTED BY METHOD					TOTAL BIRTHS AVERTED	PERCENTAGE (/100)
	IUD	STERI.	PILL	CONDOM	OTHERS		
20-24	19,220	2,644	2,549	995	1,110	26,518	8.1
25-29	69,872	26,607	11,552	2,768	1,790	112,589	34.2
30-34	51,677	41,905	4,135	2,104	849	100,670	30.6
35-39	24,405	31,952	2,121	1,344	489	60,311	18.3
40-44	9,968	15,922	570	583	456	27,499	8.4
45-49	427	726	28	20	18	1,219	0.4
20-49	175,569	119,756	20,955	7,814	4,712	328,806	100.0
PERCENTAGE	53.4	36.4	6.4	2.4	1.4	100.0	

Source: Table 5.12, Table 5.13 and Table 5.14.
Note: Steri. = Sterilization.

5.4. Application of the Prevalence Model

From the discussions above, it is clear that there are two types of methodologies for estimating program impact. One is a population-based procedure, as shown in the standardization approach, which is based primarily on macro-demographic data obtained from vital statistics or survey. The other is an acceptor-based procedure, as shown in component projection approach II, which estimates births averted from the number and characteristics of acceptors of different methods. To complement these two existing approaches, Bongaarts (1985) has developed a prevalence model for estimating gross potential fertility and gross births averted. This model is particularly applicable to situations of advanced family planning, where (1) prevalence

is high; (2) multiple methods are available; (3) the private and public sectors are both active; (4) method switching and use for spacing are frequent. China is an ideal case for applying this model.

5.4.1. Methodology

The prevalence model is based on a regression analysis of the relationship between age-specific fertility rates and age-specific contraceptive prevalence levels. The following relationship exists in each age group:

$$NAF = AF/[1-C(u'+u")];$$
$$PAF = AF(1-Cxu")/[1-C(u'+u")];$$
$$BA = (PAF-AF)Wa;$$
$$BAN = (NAF-PAF)Wa.$$

where: a = age group of women;
u' = prevalence of program contraception, by age;
u" = prevalence of non-program contraception, by age;
AF = age-specific fertility rate;
PAF = potential age-specific fertility rate;
NAF = natural age-specific fertility rate;
BA = births averted by program contraception, by age;
BAN = births averted by non-program contraception, by age;
W = number of women in age group a;
C = elasticity coefficients, by age.

5.4.2. Basic Data

For estimating age-specific natural and potential fertility rates and births averted by both program and non-program contraception, estimates of AF, POP, u', u" and C are required for each age group a. In this study, data come mainly from the 1985 Regional In-Depth Fertility Survey, assuming that there was no difference in contraceptive prevalence between 1984 and 1985. As required by the formula, prevalence of contraception is classified into two categories: (1) program contraception, which consists of the IUD, sterilization, the pill and the condom; and (2) non-

program contraception, which includes other conventional methods (see Table 5.16). These prevalence data are then adjusted by proportion fecund in each age group borrowed from an other source, namely Bongaarts (1980), in order to obtain effective users of contraception (Appendix, A.9). The coefficients C (in Table 5.17), which are a function of sterility and contraceptive use-effectiveness, are taken from the standard values (Bongaarts, 1985:101).

Table 5.16. CONTRACEPTIVE PREVALENCE, BY AGE AND METHOD, SHAANXI, 1985 (per cent)

METHOD	AGE GROUP					
	20-24	25-29	30-34	35-39	40-44	45-49
Pill	1.7	1.3	1.2	0.3	2.3	1.9
IUD	17.4	30.2	35.9	45.4	51.2	44.6
Condom	0.9	1.8	1.5	0.7	1.8	1.9
Tubectomy	2.8	20.5	39.7	40.2	24.2	12.5
Vasectomy	0.7	3.1	5.5	3.5	2.7	1.7
Program total,u'a	23.5	56.9	83.8	90.1	82.2	62.6
Non-program total,u"a	0.7	2.5	1.3	1.4	2.6	0.9
Non-user	75.8	40.6	14.9	8.5	15.2	36.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Calculated from the 1985 Regional In-Depth Fertility Survey Data.

5.4.3. Analysis and Results

Table 5.17 shows the estimated natural fertility rates (NAF) and gross potential fertility rates (PAF). NAF indicates the would-be fertility level if there were no deliberate birth control at all, while PAF indicates the would-be fertility level if there were no program efforts.

Substitution of NAF and PAF produces estimates of fertility effects and number of births averted by program and non-program contraception. As shown in Table 5.18, the difference (PAF-AF) between the actual fertility (AF) and the potential fertility (PAF) is quite remarkable. It is clear evidence of the deliberate fertility control within marriage. In 1984, a total of 625,586 births would have been

Table 5.17. CONTRACEPTIVE PREVALENCE, OBSERVED FERTILITY RATES AND ESTIMATED NATURAL AND GROSS POTENTIAL FERTILITY RATES, BY AGE, SHAANXI, 1984

AGE GROUP	u' (/100)	u" (/100)	AF (/1000)	C	NAF (/1000)	PAF (/1000)
20-24	23.0	0.7	198	0.620	232	231
25-29	55.2	2.4	163	0.823	310	304
30-34	80.4	1.2	61	0.940	262	259
35-39	80.2	1.2	15	1.022	89	88
40-44	61.7	2.0	3	1.309	18	18
45-49	30.0	0.4	1	1.898	2	2

Source: Table 5.2, Table 5.16 and Bongaarts,1980.

Table 5.18. GROSS FERTILITY RATE EFFECTS AND GROSS BIRTHS AVERTED BY PROGRAM AND NON-PROGRAM CONTRACEPTION, BY AGE, SHAANXI, 1984

AGE GROUP	NUMBER OF WOMEN POP (1000)	FERTILITY EFFECT		BIRTHS AVERTED	
		PROGRAM PAF-AF	NON-PROGRAM NAF-PAF	PROGRAM BA	NON-PROGRAM BAN
20-24	1,702	0.033	0.001	56,166	1,702
25-29	1,473	0.141	0.006	207,693	8,838
30-34	1,267	0.198	0.003	250,866	3,801
35-39	1,115	0.073	0.001	81,395	1,115
40-44	890	0.015	0.000	13,350	0
45-49	660	0.001	0.000	660	0
20-49	7,862			610,130	15,456

Source: Table 5.2 and Table 5.17.

averted, had natural fertility prevailed in Shaanxi. This figure is even higher than the actual births of 609,800 in 1984. Program contraception plays a predominant role, accounting for 98 per cent of all births averted. Program impact is particularly effective in age groups 25-35 , where three-quarters of all births averted took place.

5.5. Discussion and Conclusion

Three methods are used above to assess the impact of family planning programs on fertility in Shaanxi. By the standardization approach, the estimate of births averted by program efforts in 1984 is about 352,790, whereas by the

component projection approach II, it is 328,806. On the other hand, the number of births averted as computed by the prevalence model amounts to about 610,130, nearly twice as high as the first two estimates. It is clear that this large difference arises from the incomparability of potential fertility used in different approaches. Both standardization and component projection take the 1972 fertility level as potential fertility. The prevalence model, however, is based on the estimated natural fertility of 1984. It is certain that even in 1972 the actual fertility in Shaanxi was much lower than the natural fertility (An application of Coale's fertility index shows that the overall fertility index I_f in 1972 accounted for only 41.7 per cent of the natural fertility).

Each method has its advantages and disadvantages. Moreover, methods are not always substitutable for one another, because they answer different questions. The standardization approach is useful to identify contributions to the fertility change by each demographic component. But it has difficulty in separating direct program activities from other spontaneous birth control practices. In contrast, program effect can be more accurately estimated by the component projection approach, since calculations are based solely on service statistics. However, high-quality input data is required for reaching reliable results. The prevalence model is very easy to apply because few assumptions are made and few computations are needed.

Despite differences in methodology, all three methods come to the similar finding that the family planning program is the primary contributor to fertility decline in Shaanxi. The program success is also proved by the fact that the majority of births are averted by women in age groups 25-34 using IUDs and sterilization. These women, mostly with one or two children but still in the fertile ages, have always been those for whom the program is intended. And IUDs and sterilization, for their long-term effectiveness, are the most encouraged of all contraceptives.

Chapter 6. SUMMARY AND CONCLUSION

China is the most populous country in the world. By adopting comprehensive and effective family planning programs, China has made remarkable progress in reducing its population growth rate during the last decade. This study attempts to analyze the fertility change in Shaanxi Province, China and estimates the impact of family planning programs on fertility decline during the period 1972-1984. Data used in the study come mainly from the 1985 Regional In-Depth Fertility Survey, supplemented by service statistics of family planning.

This study began in Chapter 1 with an overview of fertility change and the family planning programs in China as a whole. In the last three decades, China's population has experienced the process of demographic transition from high birth rate, high death rate and low growth rate to moderate birth rate, low death rate and moderate growth rate. Since the mid-1950s, four rounds of birth control campaign have been launched, with the most successful being the "Wan, Xi, Shao" (Later Marriage, Longer Spacing, Fewer Children) campaign and the One-Child Policy.

Chapter 2 was devoted to a review of literature on the impact of family planning programs on fertility decline, with special reference to developing countries in Asia. The empirical findings from national and cross-national studies suggest that both socio-economic development and family planning programs have significant effects on fertility. Under similar socio-economic conditions, program areas tend to have better a record of fertility decline.

Fertility change in Shaanxi was analyzed in Chapter 3, in terms of children ever born (CEB) to ever married women, parity parity progression ratio (PPR), age-specific fertility rates (ASFR), age-specific marital fertility rates

(ASMFR) and total fertility rates (TFR), as well as cohort-period fertility rates. The results confirm a substantial fertility decline in the study areas during the last decade or so. Relative to women in older age groups, women in younger age groups are more likely to start childbearing later, have fewer children at the same reference ages, and want no more high order births, in other words, to stop childbearing earlier. The substantial fertility decline is better illustrated by the results of the cohort-period analysis. By attainment of age 30, the ASFR of the cohort currently 30-34 was only one-third of that of the cohort currently 45-49, and the cumulative CEB of the cohort 30-34 was 1.4 fewer than that of the cohort 45-49. Turning to the P/F ratio, women currently in the cohort 45-49 would have had 2.3 children fewer than that they actually achieved, had they experienced the fertility level that prevailed during the 4 years prior to the 1985 survey. It is also found that the onset of fertility decline in Shaanxi is closely associated with the rigid implementation of government family planning programs.

Chapter 4 examined the performance of family planning programs in Shaanxi, in terms of contraceptive knowledge and use. The study reveals a very high level of contraceptive knowledge among married women of reproductive ages, with each woman knowing 5.2 methods on average. The use rate is quite high with 69 per cent of women using some form of contraceptives. The most widely used methods are the IUD and sterilization. Of all contraceptives, 92.6 percent are provided by family planning programs. Unlike other developing countries, pill use is not popular among women in Shaanxi. A plausible reason is that, under strict birth control policies, particularly the One-Child Policy, women tend to choose long-term and efficient methods mainly for the purpose of family size limitation. In the study areas, use differential by educational background of women is not significant.

In Chapter 5 three evaluative methods have been employed to assess the program impact on fertility decline: standardization approach, component projection approach II,

and the prevalence model. The first two methods use the fertility level of 1972 as potential fertility. It is estimated that 328,806 to 337,850 births would have been averted in 1984 by program efforts. The last method yields an estimate of 610,130 for the same year by applying natural potential fertility. In age-specific and method-specific breakdowns, the three methods come to the similar conclusion that, of all births averted, nearly three-quarters would be averted by women aged 25-39, and about 80 per cent would be averted by using the IUD and sterilization.

From the above discussion, we can conclude that the family planning program in Shaanxi is very successful in reducing fertility through providing information and services for contraception. One of the major experiences is the special program emphasis on long-term and efficient contraceptive methods among married women of intermediate ages. The findings of this study support the argument that strong family planning programs backed by even stronger population policies are able to curtail fertility within a less developed setting and in a short period of time.

It is obvious that, apart from contraceptive use, the overall level of fertility is also affected by other factors, alternatively referred to as intermediate variables (Davis and Blake, 1956). Given data limitation, factors such as age at first marriage, age at first birth, incidence of abortion, have not been discussed in detail in this study. However, as mentioned in Chapter 1, advocating late marriage and late birth has always been an important component of China's family planning programs. In China it is also legal and acceptable to terminate pregnancy through the back-up measure of induced abortion, when contraception fails. Abortion is usually performed in family planning clinics. In this context, the impact of family planning programs is more comprehensive.

Some policy implications can be derived from the findings of this study. As discussed in Chapter 3, the current One-Child Policy has not been widely accepted in Shaanxi, with less than one-fifth of couples having only one

child. Of all women with one child, over three-quarters indicate a desire for additional child, and nearly one half do not use any form of contraception. Given the prevailing social, economic and cultural conditions in China, it is suggested that fertility policies should be adjusted, so that each couple may have two children. At the present stage, a Two-Child Policy is more realistic for both the government and the family. The government could avoid to a large extent the social and political problems, including the problem of rapid population aging, that stemmed from the One-Child Policy. On the other hand, the family could be guaranteed to a large extent with the continuity of family line or the economic basis of family welfare. Instead of adherence to the One-Child Policy, special measures should be directed to encourage late marriage, delayed childbearing, and long spacing intervals, as well as to eliminate high order births (three and above). These measures are particularly important in these years when the large cohorts born in the baby-boom of the mid- and late 1960s begin to enter marriage and childbearing ages.

An unmet demand for contraception is found among women who want no more children but do not use any form of contraception, suggesting that there is still potential to improve family planning services. Since the knowledge of contraception is nearly universal and contraceptive services are almost free, a plausible reason is perhaps the failure in contraceptive supply. Moreover, intensive education and persuasion are still needed to surmount some social and psychological barriers.

As mentioned above, China's family planning program is believed to be very successful, in terms of fertility reduction. However, comprehensive evaluation of the program itself is a regrettable lack in recent literature. It is hoped that the findings of this study will stimulate further interest in this respect. As more data become available, the following research is of great significance: (1) Study of differentials in fertility; (2) Study of differentials in contraception; (3) Analysis of continuation and termination of contraceptive use; (4) Analysis of socio-economic and

program variables in fertility change. These studies will surely provide useful information for policy-makers to improve existing programs or formulate more realistic policies.

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APPENDICES:

A.1: NUMBER OF IUD USERS, BY AGE AND YEAR OF INSERTION SHAANXI, 1981-1983

AGE GROUP	1981	1982	1983	TOTAL
20-24	26396	33115	33403	92914
25-29	94829	118968	120005	333802
30-34	82446	103432	104334	290213
35-39	58983	73997	74642	207622
40-44	42689	53556	54023	150268
45-49	20530	25756	25980	72266
20-49	325873	408824	412388	1147085

Source: Calculated from Table 4.10 and Table 4.11.

A.2: CONTINUATION RATES FOR IUD, BY AGE AND DURATION

AGE GROUP	MONTHS AFTER INSERTION		
	4.5	15	27
20-24	92.65	78.35	63.97
25-29	92.65	78.35	63.97
30-34	92.65	78.35	63.97
35-39	92.65	78.35	63.97
40-44	92.65	78.35	63.97
45-49	92.65	78.35	63.97

Source: U.N. Population Studies, No.66 (Manaual IX), p.68, Table 62.

A.3: NUMBER OF WOMEN PROTECTD AGAINST PREGNANCY, BY AN IUD AS 1 OCTOBER 1983, BY AGE AND YEAR OF INSERTION, SHAANXI

AGE GROUP	YEAR OF INSERTION			TOTAL
	1981	1982	1983	
20-24	16885	25945	30948	56894
25-29	60662	93211	111185	204396
30-34	52741	81039	96666	177705
35-39	37731	57977	69156	127133
40-44	27308	41961	50052	92013
45-49	13133	20180	24071	44251
20-49	208461	320314	382077	702391

Source: Calculated from A.1 and A.2.

A.4: NUMBER OF STERILIZATIONS, BY AGE AND YEAR, SHAANXI

AGE GROUP	1981	1982	1983	TOTAL
20-24	2759	3612	3970	10341
25-29	31808	36493	40585	108887
30-34	64721	73974	82297	220992
35-39	70469	80690	89754	240912
40-44	57748	66401	73831	197980
45-49	28604	33154	36837	98596
20-49	256109	294324	327275	877708

Source: Calculated from Table 4.10 and Table 4.11.

A.5: PROPORTION OF STERILIZATION SURVIVORS, CHINA, 1981

AGE GROUP	MONTHS		
	27	15	4.5
20-24	0.9983	0.9991	0.9997
25-29	0.9972	0.9985	0.9995
30-34	0.9935	0.9964	0.9989
35-39	0.9897	0.9943	0.9983
40-44	0.9825	0.9903	0.9971
45-49	0.9683	0.9824	0.9947

Source: Calculated from the 1981 Life Table of Chinese Population (China Population Information Centre, 1986).

A.6: NUMBER OF WOMEN PROTECTED AGAINST PREGNANCY BY STERILIZATION AS 1 OCTOBER 1983, BY AGE AND YEAR, SHAANXI

AGE GROUP	1981	1982	1983	TOTAL
20-24	2754	3608	3969	10332
25-29	31719	36439	40565	108723
30-34	64300	73708	82207	220214
35-39	69743	80230	89601	239574
40-44	56737	65757	73617	196112
45-49	27698	32571	36642	96910
20-49	252951	292312	326601	871865

Source: Calculated from A.4 AND A.5.

A.7: NUMBEROF CONTRACEPTIVE USERS BY AGE AND METHOD, SHAANXI, 1984

AGE GROUP	METHOD			TOTAL
	PILL	CONDOM	OTHERS	
20-24	8172	4039	4829	17040
25-29	39925	12117	8394	60436
30-34	20896	13464	5822	40128
35-39	18912	14810	5776	39498
40-44	18444	13465	11282	43191
45-49	10390	9424	9026	28840
20-49	116739	67319	45129	229187

Source: Calculated from Table 4.10 and Table 4.11.

A.8: PROPORTION FECUND, AND NUMBER OF EFFECTIVE USERS, BY AGE AND METHOD, SHAANXI, 1984

AGE GROUP	PROPORTION FECUND* (per cent)	METHOD			TOTAL
		PILL	CONDOM	OTHERS	
20-24	98	7608	2969	3313	13890
25-29	97	36791	8815	5700	51306
30-34	96	19057	9694	3912	32663
35-39	89	15594	9886	3598	29078
40-44	75	7403	7574	5923	20900
45-49	48	4738	3393	3033	11164
20-49		91191	42331	25479	159001

Source: * Bongaarts, 1980;
Calculated from a.7, assuming effective rate:
Pill = 95%, Condom = 75%; Others = 70 (Laign,1982)