UNIVERSITY OF SOUTHAMPTON

FACULTY OF SOCIAL, HUMAN AND MATHEMATICAL SCIENCES

SCHOOL OF SOCIAL SCIENCES

EVOLUTION OF FAMILY PLANNING POLICY AND ITS IMPACT ON POPULATION CHANGE IN CHINA

by

MIN QIN

Thesis for the degree of Doctor of Philosophy

June 2016

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my supervisors Prof. Sabu Padmadas and Prof. Jane Falkingham whose invaluable advice and suggestions have made this thesis what it is. I am very grateful for their patience, motivation, enthusiasm, and immense knowledge. I am also very grateful to Dr. James Brown who was one of my supervisors in my first year of study. I will like to express my sincere gratitude to Dr. AndrewHinde for his very useful comments during my upgrading. I am very grateful to all the staff of the Division of Social Statistics & Demography, University of Southampton. My sincere gratitude goes to the University of Southampton's ESRC Doctoral Training Centre who funded my study.

I am very thankful to China Population and Development Research Centre, particularly Dr.Bohua Li, Ms.Yaer Zhuang, Dr.Hongyan Liu, Mr.Weiping Jiang and Mr.Jianan Qi for making the needed data for this study available to me. I am also very thankful to the conference organisers of the British Society for Population Studies for giving me the opportunity to present some portions of this thesis at the conferences. I am very grateful to all participants of the conferences for their invaluable comments and suggestions. I wish to express thanks to all my colleagues on the PhD programme for their support. To my mother and my families I say thank you very much for all the encouragement and support you continue to give me.

ABSTRACT

EVOLUTION OF FAMILY PLANNING POLICY AND ITS IMPACT ON POPULATION CHANGE IN CHINA

Family planning policy (FPP) in China was introduced in the 1970s nationwide. The main policy instruments included: publicity campaigns, laws and regulations to limit the number of children women could have, and programmatic attempts to increase the availability and acceptability of contraceptives. As a consequence, the overall prevalence of contraceptive use in China increased dramatically and the total fertility rate dropped steadily to below replacement level within the next two decades. However, the unprecedented pace of fertility decline led to an accelerated population aging, distorted sex ratios and changes to the Chinese family structure and kinship system. The debate about the future change in FPP in China remains ongoing. Some scholars fear that a sudden relaxation of the policy would stimulate a baby boom; others argue that socio-economic factors rather than the policy are now the key determinants of current fertility and thus that relaxation, even abolition, of the policy would have only a small effect; and a slight increase in fertility would actually benefit the country. The overarching aim of this thesis is to undertake a systematic quantitative investigation of the evolution of family planning policy processes in China and their impact on contraceptive use and reproductive behaviour. In addition, the thesis provides a methodical overview of official documents and research reports to examine the evolution of population and family planning policies in China across different social, economic and political situations. To date, there is little systematic research that evaluates the impact of FPP on population change in China at the individual level. Data for this study come from 6 consecutive National Population & Family Planning cross-sectional surveys conducted in 1982, 1988, 1992, 1997, 2001 and 2006 respectively. Changes in total fertility rates over time are decomposed to examine the contribution of changes in marriage and successive parity progression ratios. A discrete time complementary log-log survival model is then employed to examine the policy effects on women's parity transition. Finally, a multilevel logistic regression model is used to evaluate the effect of the 'informed choices policy' on women's contraceptive behaviour.

The results show that fertility in China has been declining dramatically since the 1970s, reaching replacement level in early 1990s and decreasing continually afterwards to well below replacement in the most recent two decades. Consistent decline in parity progression ratios over time demonstrate evidence of the FPP as potential trigger of fertility decline across China. The fertility differentials attributed to the policy remain convincing in both the transitional and post transitional stage. However, the disaggregation of fertility change among different subpopulations indicates that socioeconomic conditions also played an important role. The results also demonstrate that parity progression ratios to second and third births tend to be lower after the introduction of FPP and the differential effect of policy seems to exist, even after controlling for demographic and socio-economic factors. There is a negative effect of increasing women's education on parity transition. Moreover, the FPP has differential effects on educational groups. The results provide evidence of improved informed choice among the contraceptive "new users" after the ICPD action plans introduced in 1994. Overall, the findings suggest that the FPP affects the average fertility of the population in China throughout the fertility transition process. A certain level of socioeconomic development is, however, a necessary prerequisite for FPP implementation and compliance. FPP and women's education both play important role in shaping fertility behaviour. The low level of fertility achieved in China is the joint result of FP policies and, as seen in other societies, influenced by increasing women's education. Had the strict FP policy been not in place at all, then with the concomitant social and economic development witnessed in China over the past 3 decades, the fertility increase might not be as large as is often assumed.

Academic Thesis: Declaration Of Authorship

I, ……Min Qin……..

declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

… **Evolution of Family Planning Policy and Its Impact on Population Change in China**
……..

……
……

I confirm that:

1. **This work was done wholly or mainly while in candidature for a research degree at this University;**
2. **Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;**
3. **Where I have consulted the published work of others, this is always clearly attributed;**
4. **Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;**
5. **I have acknowledged all main sources of help;**
6. **Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;**
7. **Either none of this work has been published before submission, or parts of this work have been published as: [please list references below]:**

Contents

LIST OF TABLES

LIST OF FIGUERS

CHAPTER ONE

INTRODUCTION

1.1 SPECIFICATION OF THE RESEARCH PROBLEM

Family planning policy (FPP) in China introduced in the 1970s nationwide was initially targeted towards one generation and implemented mainly to reduce the high levels of poverty attributed to burgeoning population growth at that time. The main policy instruments included laws and regulations to limit the number of children women could have and programmatic attempts to increase the availability and acceptability of contraceptives. In consequence, the overall prevalence of contraceptive use increased dramatically and the total fertility rate dropped steadily to a level below replacement within two decades. However, the unprecedented pace of fertility decline during last three decades has led to an accelerated population aging, distorted sex ratios and changes to the Chinese family structure and kinship system. For more than a decade, demographers have strongly argued for a substantial modification of the strict family planning policy (Wang 2005, 2011; Zeng 2007; Cai 2012; Liu 2013). In November 2013, the new leadership of the Chinese Communist Party (CPC) announced the relaxation of the hitherto strict family planning policy. Under this renewed policy, families are allowed to have two children if one of the parents is an only child. In October 2015, the government announced it would further relax the rules to allow all couples to have two children, signalling a new era in China's FPP. The public debate about the future of the policy still continues. Some scholars fear that a sudden further relaxation of the policy would stimulate a baby boom (Zhai and Li 2014; Feng 2014); others argue that socio-economic factors rather than the policy are the dominant determinants of current fertility and further relaxation, or even abolition, of the policy would have only a minor effect. Furthermore it is argued that a slight increase in fertility would actually benefit the country (Gu and Li 2010; Cai 2010; Wang et al. 2012).

The general effect of family planning programmes on fertility decline has been affirmed

in developing countries in recent decades through promoting access to contraceptives and diffusing attitudes favourable to their use (Tsui and Bogue 1978; Bongaarts and Sinding 2011; Jain and Ross 2012). Governments can influence fertility also by altering the institutional context for individual fertility choices (McNicoll 2001). Chinese FPP polices are deliberately constructed institutional arrangements and specific programmes aimed at controlling population growth through which governments can directly monitor and influence the number and spacing of births. It is widely believed that these family planning policies have had an influential role in accelerating fertility decline, and hence slowing population growth in China (Tien 1984; Feeney and Yu 1987; Feeney and Wang 1993; Yang and Chen 2004; Retherford et al.2005). However, there is lack of systematic quantitative investigation on how FPP have evolved in response to social and political changes across China, and how they have impacted fertility behaviour across time, particularly recently within the context of a shift towards informed contraceptive choices. The relationship between FPP effort, socio-economic development and fertility decline in China remains inconclusive, especially at the end of the fertility transition period. Some researchers claim that FPP is the key determinant of fertility change in China (Feeney and Yu 1987; Yang and Chen 2004; Retherford et al.2005) while others argue that the FPP impact on fertility transition has been overstated (Tien 1984; Poston and Gu 1987; Schults and Zeng 1999; Cai 2010). However, the evidence to validate these competing claims is patchy. In particular, some studies were restricted in terms of systematically examining the impact of FPP over time, or longitudinal effects, or lacked representation at national and regional levels. Aggregate cross-sectional data provide only limited information on the effect of the underlying mechanisms of FPP and their interaction with socioeconomic factors on fertility behaviour. Moreover, existing constructs or measures of FPP influence / efficacy have several limitations in terms of incompleteness, endogeneity, and randomness (Wang 2012).

1.2 AIMS OF THE THESIS

The overarching aim of this thesis is to undertake a systematic quantitative investigation of the evolution of family planning policy processes in China and their impact on contraceptive use and reproductive behaviour. In addition, the thesis provides a

methodical overview of official documents and research reports to examine the evolution of family planning policies in China across different social, economic and political situations.

1.3 RESEARCH QUESTIONS

The following specific research questions are addressed in this study:

1. What are the effects of family planning policy on the process of fertility transition in China? How do socio-economic environment mediate the influence of family planning policy on fertility change over time and place?
2. To what extent does family planning policy affect women's fertility behaviour (particularly the transition to second and third births) over time? How does the policy influence fertility behaviour of different education groups across time?
3. Are there noticeable effects of the 'informed choices' policy on women's contraceptive behaviour? What are the factors that explain the shift towards informed method choices?

The findings are presented in three inter-related chapters, each following a research paper format including, where appropriate, a detailed description of study instruments and statistical methods.

1.4 RESEARCH HYPOTHESES

A set of inter-related hypotheses are proposed reflecting on the research questions addressed in Section 1.3.

1. Family planning policy is the driving force of fertility decline throughout the fertility transition process;
2. Social economic context played an important role for policy implementation and FPP compliance;
3. The introduction of FPP reduced the parity progression risk to second and third births;

4. There is an inverse relationship between women's education and parity transition;
5. Family planning policy has differential effect on educational groups;
6. The provision of informed contraceptive choices has improved nationwide since late 1990s.

1.5 OBJECTIVES OF THE THESIS

The specific objectives of this research are to:

1. Investigate the effect of family planning policy and its associated socio-economic factors on fertility transition process in China by synthesising micro data from the 1982, 1988, 1992, 1997, 2001, 2006 national population and family planning surveys and the macro data from National Bureau of Statistics (NBS).
2. Examine the extent of the impact of family planning policies and associated educational differentials on women's fertility behaviour over time.
3. Investigate whether the shift towards informed choices has had any positive impact on women's contraceptive behaviour.

1.6 POLICY RELEVANCE

Family planning policy has been implemented for over thirty years in China. The policy was primarily aimed at achieving national economic development goals through reducing population growth, renouncing the reproductive and family aspirations of an entire generation. Aside the strict policy operations are the criticisms levelled against the government in violating basic human and reproductive rights. Moreover, the policy was implemented against the desire and consideration of the majority of Chinese people. On the other hand, the evidence regarding the magnitude of the policy effect on individual reproductive behaviour is mixed and inconclusive. Whether it was at all necessary for the government to enforce a strict family planning policy at the time when fertility was already declining remains an open question. Ironically, over the last two decades, fertility levels have declined consistently across China, especially in cities and

urban areas at below replacement level, and in the last decade or so converging more towards low fertility. Consequently, there have been considerable changes in the population age structure and composition, for example, population ageing, weakening of traditional family systems, skewed sex ratios at birth and reduction in the size of work force.

There is clearly a need to systematically review the processes and implementation of the stringent family planning policy and to quantify the policy response and impact on contraceptive use and fertility behaviour. This study will contribute to a better understanding of the independent and interactive effects of policy and socioeconomic factors associated with fertility decline in China. The findings from this research are aimed at inspiring researchers and policy makers to rethink about the rationale and prospects of FPP in China.

1.7 ORGANIZATION OF THE THESIS

The thesis is organized into seven chapters. Chapter one introduces the research problem, outline the rationale, aims and relevance of the research.

Chapter two of the thesis presents an overview of the concepts, rationale and evolution of population policies with a focus on China, including the nature and implementation of family planning policy along with a description of fertility and contraceptive use trends and differentials. A summary of relevant literature is then revisited in the three research papers that form Chapters four, five and six.

Chapter three provides a description of the data resources and statistical methodology. The first section of the chapter describes the datasets used in this study including data from the first to the sixth round of Population and Family Planning surveys in China conducted in 1982, 1988, 1992, 1997, 2001 and 2006. The second section appraises the quality and reliability of survey data. The third section addresses the strengths and limitations of the datasets and the last section describes the statistical methods for three papers.

Chapter four presents the findings of the first paper which illustrates the impact of family planning policy on fertility trends by parity from 1971 to 2005.

Chapter five presents the findings of the second paper which examines the effect of family planning policy on the transition to second and third birth and the effect of FPP across different educational groups over time.

Chapter six presents the findings of the third paper which examines the effect of new client centred strategies on contraceptive method mix, and explore the determinants of informed contraceptive choice.

Finally, Chapter seven summarizes the main findings and conclusions of the study, and highlights the policy implications and recommendations for future research.

CHAPTER TWO

POPULATION POLICIES AND DEMOGRAPHIC CHANGE IN CHINA: A LITERATURE REVIEW

Most governments have at some time addressed population issues at the national level. Population policies are defined as the actions taken explicitly or implicitly by governments in order to address the imbalances between demographic changes and social, economic and political goals (Demeny 2003; May 2012). In this thesis, population policies aimed at facilitating fertility reduction are defined as family planning policy (FPP). This chapter presents an overview of the contextual determinants of the FPP process and policy circle, with a case study of China. The 'policy circle' is a framework with which to analyse the components of population and health policies, vis-à-vis family planning, reproductive, maternal and sexual health including HIV/AIDS (Hardee et al. 2004). Evolution of family planning policy, fertility trends and differentials, contraceptive use trends and the family planning policy circle in China are reviewed systematically, examining research reports, articles and registration data from published and unpublished sources.

2.1 DEBATE ON POPULATION GROWTH AND DEVELOPMENT AND ITS IMPLICATIONS FOR POLICY MAKING

The relationship between population growth and development is complex given that many variables are associated with both birth rates and economic growth. Existing evidence regarding the relationship is rather inconsistent and inconclusive, suggesting that multiple directions of associations and causality.

Thomas Malthus in his famous 'An Essay on the Principle of Population' published in 1798, warned that population growth would exceed resource growth and sustenance, leading to catastrophic checks, such as famine or war, on overpopulation (Malthus 1798). This would occur when population grows exponentially while food supply grows

arithmetically. Rapid population growth would eat up any surplus subsistence wages. As a solution, Malthus called for moral restraint: people must practice abstinence, and only have more children when they can support them. From the Malthusian theory, responses to population growth stem from individuals and couples. During the nineteenth century, the alternative to Malthus' proposition was the theory of Karl Marx and Engels. They reacted against Malthus' population theory and disagreed on the nature and even the existence of population problems. Their main argument is that rapid population growth is the consequence, not the cause of economic and social inequalities. A 'surplus population' is a creation of capitalism which requires an exploitable manpower, and a necessary condition for its continuance. Marx considered population issue to be neutral with respect to the driving forces of history and thus the State has no role to play on it (McQuillan 1982).

Population issues attracted significant attention after the end of World War II when an unprecedented growth of population emerged in the developing world during 1940s-1960s, which alarmed the internationalists who were concerned about building a more stable post-war world. An intense debate took place between the neo-Malthusians and the anti-Malthusians on rapid population growth and poverty as well as the capacity of systems to adapt to change. Coale and Hoover (1958) provided projections of economic development for India and Mexico under the alternative assumptions of constant fertility and declining fertility, and argued that high social expenditures on schools and health care due to a young age structure diverted funds from capital investment. They concluded that high population growth leads to poor socio-economic development, and thus governments should intervene to control population (Coale and Hoover 1958). Alarms of rapid population growth also were raised among ecologists and other biological scientists. Renowned human ecologist, Ehrlich (1968) argued that population growth was putting unsustainable pressures on ecological systems in terms of food production, biodiversity and environmental degradation. As for the solution, he wrote, "we must rapidly bring the world population under control, reducing the growth rate to zero or making it negative. Conscious regulation of human numbers must be achieved. Simultaneously we must, at least temporarily, greatly increase our food production."

(Ehrlich 1968, page 131). On the other side were mainly economists, arguing the positive side of population growth and considering human beings as the vital and most essential necessity for economic development, since human ingenuity would create technology to overcome any environmental constraints to development. Economists such as Boserup and Simon suggested possible positive effects of population growth, including economies of scale, acceleration of technological progress, flexible market responses to emerging shortages, induced institutional change, cheaper communication and transportation, and easier collective social investments (Boserup 1965, 1981; Simon 1981). Academic disagreement led to different policy formulation. The more alarmist community pressed for strong measures to alter individual reproductive behaviour, whilst others generally opposed public action to influence individual reproductive behaviours (Bongaarts et al. 1990).

The debate was most strongly heard in the early and mid-1970s. The World Population Conference in Bucharest in 1974 was the first global conference of official government representatives to discuss the relationship between population and development as well as to consider population policies (Finkle and Crane 1975). In this conference, the majority of the developing countries joined the socialist side in opposition to global demographic goals that were sponsored primarily by the United States. The revisionists stressed that 'development is the best contraceptive', and underdevelopment produces rapid population growth, suggesting the need to invest resources for development. Over the next decade, the population debate continued in academic and policy arenas. But the statistical association between population and resources remain a subject of intensive discussion. In 1984, at the International Population Conference in Mexico City, the USA delegates reversed its position and considered population growth a "neutral phenomenon" in development, suggesting economic reforms must take priority, e.g., free markets, democracy, etc. (Finkle and Crane 1985). This stand was disputed by most developing countries including China. Reports from the US National Academy of Sciences (NAS 1986), World Bank (1984) and Kelley (1988) observed that there was only a modest or null impact of population growth on the pace of economic development and the consequence of rapid population growth varies considerably depending on economic, cultural, institutional and demographic difference among

developing countries. Family planning programmes would ideally raise family well-being by helping couples achieve their fertility goals. But the macro economic benefits were largely unconfirmed. The proceedings from those reports set the stage for the Cairo Conference. The International Conference on Population and Development (ICPD) at Cairo in 1994 advocated human beings and human rights as the centre of concern for sustainable development. Thus advancing human rights, especially gender equality, equity and empowerment of women becomes the key to population and development related programmes (Roush 1994; McIntosh and Finkle 1995).

Although most economists continued to see population growth as a relatively minor explanatory factor in overall economic performance, the ecologists remained worried about the impact of rapidly growing population size on fragile ecosystem and emphasized the need to control this growth. The agreement was that rapid population growth caused by high fertility level exerts severe constrains on countries with low levels of socioeconomic development (Kelley 1988; Birdsall and Jamison 1983). The World Bank (1984) estimated that a population growth rate above the threshold of 2 per cent per year could slow down the increase of income per capita in poor countries. Another consensus focused on the consequences of demographic dividend. A combination of rapidly declining fertility and coherent macroeconomic policies produced a significant demographic bonus that propelled countries such as Korea and Thailand to achieve high levels of economic growth and produce much larger income per capita (Cassen 1994; Mason 2001). The explanation is that a rapid fertility decline reduces the economic dependency ratios and boosts the share of potential labour force, which enables governments to raise human capital investment levels and also increase the economic investments.

In spite of the ongoing debate, most developing countries appear to be persuaded that rapid population growth imposes significant development burdens and slower rates will considerably ease at least short-term burdens on health, education and social welfare budgets. The statements on population policy provided by nearly all developing countries at the 1994 ICPD showed that the vast majority regarded their rates of population growth as too high and indicated that they had polices in place to bring those

rates down (McNicoll 2001; Demeny 2003; Sinding 2000).

2.2 POPULATION POLICIES AFTER WORLD WAR II

Population growth in Asia, Latin America, and Africa accelerated precipitously after 1950 following a reduction in death rates while birth rates remained high. Population explosion during the 1950s and 1960s led to national and international policy-makers' concern about the threat to the well-being of mostly poor societies. Initiating utilitarian family planning policies in the developing world was the main strategy used to address rapid population growth, high fertility, and unintended childbearing (Bongaarts and Sinding 2011). Many governments in the developing world implemented voluntary family-planning programmes to provide information about, and access to, contraceptives. Only in rare cases has coercion been used, for example, family planning policy in China and during the brief emergency period in India in 1976–77. India was the earliest country to adopt a national population policy as an integral part of its development plans in 1951. The majority of other developing countries legislated national policies tackling demographic concern until the late 1960s and early 1970s. In 1976, only 34 per cent of the governments of developing countries intervened to lower fertility. In 2009, the effort amounted to 51 per cent (United Nations 2010).

Governments in East Asia cautiously initiated efforts to slow rates of growth in the late 1950s and early 1960s (Mason 2001; Frejka et all. 2010). They began to dismantle legal obstacles to fertility reduction. In 1961, South Korea set aside its law prohibiting the importation or production of contraceptives. Key political groups were persuaded of the importance of slowing population growth. The governments adopted national development plans with specific population growth-reduction targets. They initiated public campaigns to persuade couples of the importance of bearing fewer children. They expanded contraceptive services through education efforts. Family planning clinics and distribution systems were established to increase the availability of contraceptive supplies and services. In the early 1970s, some governments introduced incentives and disincentives to boost family planning programmes. For example, Singapore adopted a comprehensive set of incentives and disincentives. Similar efforts were pursued

elsewhere in the region. Many of these efforts relied on financial incentives, but other initiatives were designed to confront some of the social under-pinning of high fertility.

2.3 RATIONAL OF THE STATE INTERVENTION ON RAPID POPULATION GROWTH

Whether and how governments should intervene on the challenges of high fertility and rapid population growth is an ongoing debate. Population activists raised the concept of economic externality–supposed discrepancies between the private and social costs for childbearing, and called for government actions to reduce fertility (Lee and Miller 1990). The level of fertility is essentially the result of decisions people make as individuals, aiming at the achievement of individual or family goals. At the country or global level, however, the sum of these personal decisions can sometimes have adverse effect when the costs to society are greater than those born by individuals. High fertility may bring wealth and power to some families, but jeopardize the well-being of the community and its physical environment by depleting natural resources, causing deforestation in the case of agrarian societies, aggravating unemployment and poverty levels, and/or creating anarchic urbanization (Hardin 1968; Pebley 1998). Government is the prime actor that implements family planning policies, given the legitimacy of states derives from their obligation to pursue the common wellbeing of their citizens. The opposed opinion, however, is that instead of government intervention, it might be better to let natural and self-regulatory mechanisms do their work (Demeny 1988). Some economists found that the discrepancies between private and social costs in some high fertility societies as Bangladesh and Kenya appear to be minimal (Cassen 1994).

It has been an on-going concern to balance individual and societal freedoms, rights, and responsibilities. The priorities and method to reach policy goals have changed over recent decades. In the 1960s and 1970s, macro-demographic strategies advocated by international organizations in order to curb high fertility were adopted by states. Demography was said to be transformed from a social to a policy-oriented science (Hodgson and Watkins 1997) and the approaches were later viewed as neglecting the rights and aspirations of individuals and couples (May 2012; United Nations 1993). In

the 1994 ICPD, individual rights and needs were reaffirmed. Family planning was integrated in the larger context of reproductive rights, which encompasses actions to improve reproductive and sexual health, decrease maternal mortality levels, and slow down the spread of HIV/AIDS epidemic (United Nations 1993).

2.4 CONFIGURING FAMILY PLANNING POLICY PROCESSES FOR FERTILITY REDUCTION: TOWARDS CONCEPTUAL FRAMEWORKS

The policy process consists of conditions, events and products that connect the initial idea of a policy to its ultimate development, implementation and evaluation (Hardee et al. 2004). Policy making occurs within various political, social, culture, and economic settings and the policy circle, as proposed by Hardee et al, comprises six major elements (Figure 2.1): the problems that arise requiring policy attention; policy stakeholders and institutions: government, nongovernment, communities, individuals (People); policy development: issue framing, agenda setting, data analysis, advocacy, dialogue, formulation (Process); resources allocation (Price tag); Policies, laws, regulations (Paper); policy implementation in achieving policy goals and objectives: organizational structure, resources and evaluation (Programmes/Performance).

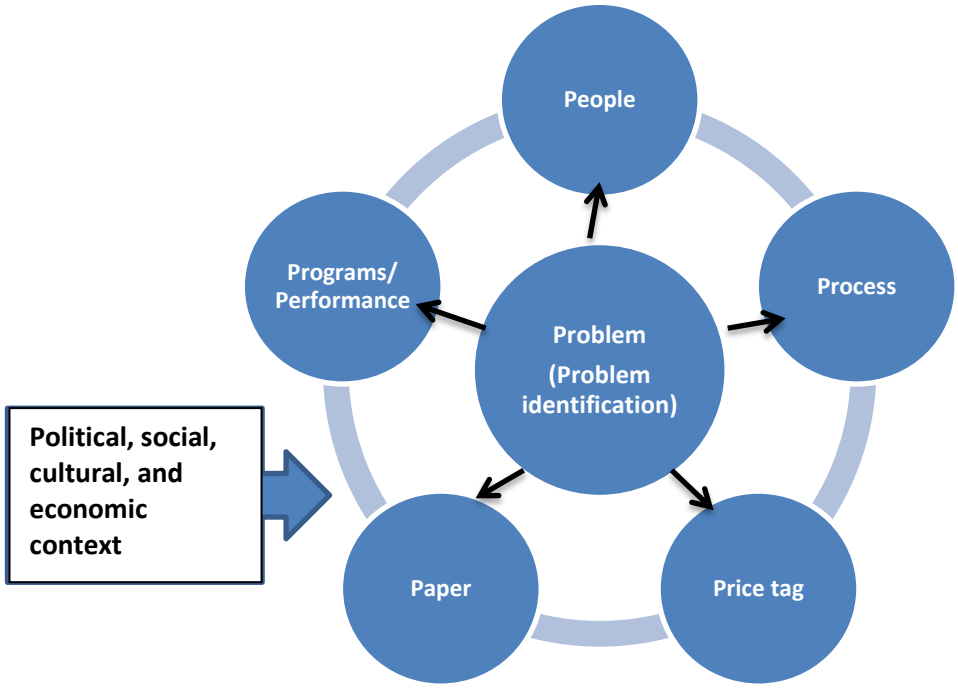


Figure 2.1. Policy Circle (adapted from Hardee et al. 2004 Page4).

The family planning process begins with the recognition that demographic issues do exist and need to be addressed. The policy may result from a government's response to contraceptive demands initiated by citizens created by the past social change such as developed industrialization, urbanization and literacy; or it may be from governmental commitment to rapid modernization which is relatively independent of citizen demands (Godwin 1975).

Figure 2.2 shows family planning policy as a determinant influencing fertility levels and fertility regulation. Family planning policy interventions are making family planning information and services available; enacting normative laws and regulations or adopting institutional reforms; using taxes and subsidies in the form of financial incentives or disincentives (Tsui 2001; McNicoll 2001). Several indirect interventions that are beyond family planning may also be used successfully, such as investments in female education and enhanced female participation in the labour force (World Bank 1984). Family planning policies are implemented within the specific administrative settings of the states. Organized and bureaucratic norms and constraints influence family planning policy implementation. Contextual factors, such as education, urbanization, gender roles and cultural norms also matter. Policies may benefit from higher levels of female education and the impact of Information, Education and Communication (IEC) campaign. Individuals are seen as self-ruling actors who behave based on decisions made through contextualized interpretation and negotiation (Spillane et al.2002; May 2012).

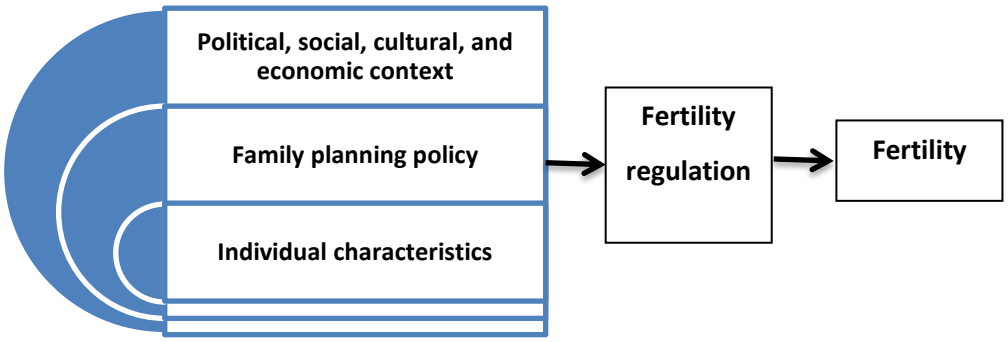


Figure 2.2 Family Planning Policy as a Determinant of Fertility Regulation and Fertility (adapted from World Bank 1984 Page106)

2.5 FAMILY PLANNING CONTEXT AND IMPLEMENTATION IN CHINA

China is the most populous country in the world with its total population increasing from 580 million in 1953 to over 1.3 billion in 2010. The country has been facing challenges to their economic and social progress largely generated from population, resources and environment. Limited resources such as arable land, forests, grassland, and fresh water make it a concern to feed the large population and improve their living standards (Peng and Guo 2000). Family planning in China is called '*jihuashengyu*', meaning 'planned childbirth'. In this study, we define family planning policy as actions taken by the government in order to address the imbalance between rapid population growth and political and socio-economic goals. The major purpose of the family planning policy in China is to lower fertility so as to control the burgeoning population size. The scope of actions includes campaigns, contraceptive service provision, laws and regulations, incentives and disincentives. The term family planning policy has exchangeable alternatives in the literature as one-child policy, birth planning policy, fertility policy, and population policy for fertility reduction. China is the only country with the state directly limiting the number of children a couple would have.

There have been a large number of previous studies that have analysed, described, or evaluated family planning policy in China. The objective of this section is to explore family planning policy processes and shed light on their determinants and consequences, with a particular focus on the 'Later, Longer and Fewer' FPP during 1973-1979 and the more strict FPP after 1979. The implications across political, social and economic settings are drawn for further policy reform.

2.5.1 EVOLUTION OF FAMILY PLANNING POLICY

FPP in China has been widely documented in the demographic and social science literature ever since it was introduced in the society (Tien 1980, 1984; Bongaarts and Greenhalgh 1985; Greenhalgh 1986, 2003; Hardee and Banister 1988; Liang and Lee 2006; Gu et al. 2007; National Population and Family Planning Commission (NPFPC) 2007; Wang 2012). While some studies have examined the development and implementation of the policy across different time points, others have focused on its demographic and social economic consequences. Given the aim of this paper, below we summarise those FPP that had clear targets on delaying marriage age and childbearing and increasing contraceptive use over time.

In the early 1950s the attitude of the Chinese government was actively in a pro-natalist mode, encouraging births. The Ministry of Health issued a regulation on 'Restricted Birth Control and Induced Abortion' in 1952, putting restrictions on contraceptive use and induced abortion. However, the results of the first census in 1953 made the government rethink about the population issue. In addition, with more and more women participating in paid employment and an increasing demand for contraceptives, the birth control restriction regulation was revised in 1954 to guide people's contraceptive use. In the late 1950s and 1960s, government efforts were focussed on disseminating the ideals of small family size and enriching contraceptive supply first in urban areas.

'Later, longer, fewer FPP' (1973-1979) also known as '*wan, xi, shao* FPP', emphasising delayed marriage, long birth spacing and limits on the overall number of births was introduced in 1973. 'Later' means late marriage and late child bearing. Marriage age was encouraged to be later than 23 years old for female and 25 years old for male. Childbearing age was encouraged to be later than 24 years old for female. 'Longer' means longer birth interval, at least 3 years between births were recommended. 'Fewer' means number of children no more than two.

'One child FPP'(1979-1984) In 1979, realizing rapid population growth was putting considerable strain on the socio-economic development and believing that birth control is a fundamental part of sustainable development, China began to promote 'one couple, one child' which became the most controversial FPP (Greenhalgh 2003) in the entire human history. In 1980, the Communist Party of China (CPC) Central Committee issued an open letter to all Party members and Youth Leagues to promote "one couple, one child." However, four years of strict FPP implementation caused considerable dissent, especially in rural areas.

'Differentiated FPP'(1984 onwards) In 1984, the CPC Central Committee and State Family Planning Commission issued Central Document 7, which allowed for second children among rural couples with 'practical difficulties', as long as the couples adhered to regulations outlined in the local plan. This document led to discrepancies in policy across provinces. Since the mid-1980s, the provinces (autonomous regions and municipalities) under the CPC Central Committee and the State Council's overall requirements, combined with the local situation, have been allowed to develop local population and family planning regulations to make specific provisions. The differentiated FPP can be broadly divided into four types based on the average number of children per couple permitted: **one** child, **one and half** children, **two** children, and **three** children (Greenhalgh 2003; Gu et al. 2007; NPFPC 2007). The features of the

policy, the provinces covered and population coverage by each policy is listed in Table 2.1 and illustrated in Figure 2.3.

Table 2.1. Description of the Main Types of Differentiated FPP from 1984 onwards

Type of FPP	**Regions/ provinces covered**	**Nature/ features of the policy**	**per cent of population covered**
One child	Nationwide urban *Hukou* residents Rural *Hukou* residents in six provinces (municipalities): Beijing, Tianjin, Shanghai, Jiangsu, Sichuan and Chongqing	Couple can have only one child	36
One and half children	Rural *Hukou* residents in nineteen provinces (autonomous regions and municipalities): Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Guizhou, Shaanxi, Gansu.	If the first child is a girl, then a second child is permitted	53
Two children	Rural *Hukou* residents in five provinces (autonomous regions): Hainan, Yunnan, Qinghai, Ningxia, Xinjiang	Couple can have two children	10
Three children	Ethnic minority farmers in Qinghai, Ningxia (mountainous areas) and Xinjiang; ethnic minority farmers in Hainan and Inner Mongolia whose first two children are girls; ethnic minority farmers in Yunnan border areas and sparsely populated minority residents in Yunnan and Heilongjiang.	Couple can have three children	2

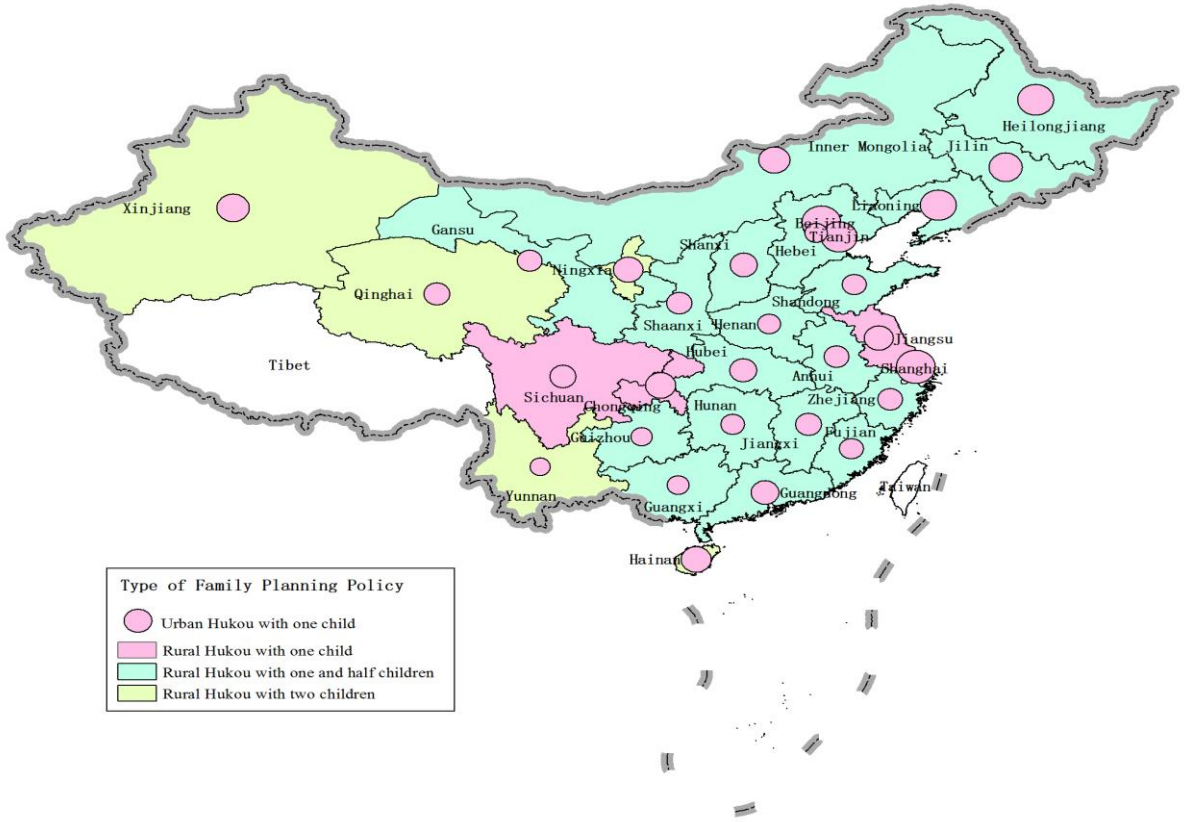


Figure 2.3. Map of Geographic Distribution by Main Types of Family Planning Policy

By 2013, couples who were *both* from an 'only child' family were permitted to have two children right across China, except in Henan province one of the most populous provinces. The policy of where if either husband or wife from 'only child' family, they can have two children was applied in rural areas in seven provinces, which are Tianjin, Liaoning, Jilin, Shanghai, Jiangsu, Fujian and Anhui. In November 2013, the new leadership of the Chinese Communist Party (CPC) announced a "softening" of the strict family planning policy: all families will be allowed two children if one parent is the only child regardless of province. It should also be noted that the implementation of the one-child policy is not an absolute one-child policy. There are some exemptions that have allowed couples to have a second child, in circumstances such as remarriage, or where the first child is disabled or legally adopted. Apart from the number of children, the age at (delayed) marriage and (long) birth interval were also regulated. In general, first marriage age should be later than 23 years old for female and 25 years old for male.

Childbearing age should be later than 24 for female. Moreover, the birth interval should be 4 years at least, when progression to another child is permitted.

China has 5 ethnic autonomous regions (Inner Mongolia, Xinjiang, Guangxi, Ningxia, Tibet) and 30 ethnic autonomous prefectures, covering 8.5 per cent of the total population. Family planning was not encouraged among ethnic minority groups before 1980s. Since 1980s, family planning policy among ethnic groups was gradually established by provincial level government or People's Congress based on local socio-economic situation and people's desire, with the policies being more flexible than those for the Han ethnicity which constitutes about 92 per cent of the Chinese population. For example, Tibetan urban residents can have two children, and there is no restriction in terms of the number of births for Tibetan farmers living in the sparsely populated areas.

2.5.2 POPULATION CHANGE IN CHINA

I. Historic population features

Lee and Wang (2001) describe historical Chinese population features and compares with that of west populations. Historically high mortality rate and high fertility rate enabled China to maintain low population growth at the aggregate level until modern times, with a long-term annual average growth rate of less than 5 per ten thousand. In the first century A.D. there were some 75 million Chinese. By 1750, in spite of a frontier expansion that more than doubled Chinese territory, China's population had grown only threefold. Between 1750 and 1950 the population increased by some 150 percent from 225 million to 555 million, an annual rate just short of 5 per thousand. Then between 1950 and 1999, the population more than doubled from 555 million to 1.27 billion, an annual rate of almost 1.7 per hundred. The average annual rate of population growth grew considerably, reflected in absolute terms from ten-thousands during much of the last two millennia to one-thousands during much of the last three centuries, to one-hundreds during much of the last 50 years. The country's nearly 1.3

billion people account for roughly one-fifth of the world's population. This proportion was even larger in the past. During the last two millennia, including the last three centuries, one of every three to four persons has been Chinese.

Contrary to the European society, historically Chinese women experienced earlier and universal marriage and lower marital fertility. While Western married women, in the absence of contraception, had a total marital fertility rate (TMFR) of 7.5 to 9 children, Chinese married women had a TMFR of 6 children or less **(**Lee and Wang 2001). There has long been collective nature of Chinese demographic process. Marriage and reproductive behaviour were exercised at the collective level rather than the individual level. The patrilineal and patrilocal familial system, influenced by Confucian culture and supported by the imperial state, intervened in the processes of marriage and childbearing widely. For instance, marriage was arranged by the clan families and was not a personal choice. The primary purpose of marriage was to have offspring to continue the family line of the paternal clan. Without producing a male heir was the gravest offense against filial piety. Only sons could sacrifice to the family spirits, carry the family name and generally inherit the family patrimony.

II. Modern demographic transition

China had suffered severe conflict for over twenty years before the foundation of the People's Republic of China in 1949. The country experienced the onset of its demographic transition in a society with a relatively low level of socio-economic development, but progressed at unprecedented pace due to strong government supported programmes for public health, birth control policies, institutional changes and social reform. A comparison of demographic trends between Europe and China shows that unlike the fertility transition in Europe which was due largely to an individual decision-making, the onset of the Chinese fertility transition was triggered by the collective decision-making process from the state, supported by long-standing and embedded Chinese social, cultural, and political traditions (Lee and Wang 1999).

Demographic transition in China began in 1950s, with first mortality declining rapidly; fertility remaining high for over twenty years at about an average of six children per woman. The country experienced rapid population growth due to the high fertility, a sharp decline of infant mortality rate and consistent increase of life expectancy at birth (Lu and Zhai 2009).

It can be seen from Table 2.2 and Figure 2.4 that a sudden and continuous decline of crude death rate (CDR) has taken place since 1950 and from 1949 to 1957 the CDR was reduced by almost half. After the crisis period in 1958 (The Great Leap Forward) and the following three years famine period, CDR continued to decline steadily and reached a low level of below seven per thousand and maintained this level with small fluctuations after late 1970s.

Table 2.2. Crude Birth Rate, Crude Death Rate and Natural Increase Rate 1949-2010.

Year	CBR (per thousand)	CDR (per thousand)	Natural increase (per thousand)	Year	CBR (per thousand)	CDR (per thousand)	Natural increase (per thousand)
1949	36.0	20.0	16.0	1980	18.2	6.3	11.9
1950	37.0	18.0	19.0	1981	20.9	6.4	14.6
1951	37.8	17.8	20.0	1982	22.3	6.6	15.7
1952	37.0	17.0	20.0	1983	20.2	6.9	13.3
1953	37.0	14.0	23.0	1984	19.9	6.8	13.1
1954	38.0	13.2	24.8	1985	21.0	6.8	14.3
1955	32.6	12.3	20.3	1986	22.4	6.9	15.6
1956	31.9	11.4	20.5	1987	23.3	6.7	16.6
1957	34.0	10.8	23.2	1988	22.4	6.6	15.7
1958	29.2	12.0	17.2	1989	21.6	6.5	15.0
1959	24.8	14.6	10.2	1990	21.1	6.7	14.4
1960	20.9	25.4	-4.6	1991	19.7	6.7	13.0
1961	18.0	14.2	3.8	1992	18.2	6.6	11.6
1962	37.0	10.0	27.0	1993	18.1	6.6	11.5
1963	43.4	10.0	33.3	1994	17.7	6.5	11.2
1964	39.1	11.5	27.6	1995	17.1	6.6	10.6
1965	37.9	9.5	28.4	1996	17.0	6.6	10.4
1966	35.1	8.8	26.2	1997	16.6	6.5	10.1
1967	34.0	8.4	25.5	1998	15.6	6.5	9.1
1968	35.6	8.2	27.4	1999	14.6	6.5	8.2
1969	34.1	8.0	26.1	2000	14.0	6.5	7.6
1970	33.4	7.6	25.8	2001	13.4	6.4	7.0
1971	30.7	7.3	23.3	2002	12.9	6.4	6.5
1972	29.8	7.6	22.2	2003	12.4	6.4	6.0
1973	27.9	7.0	20.9	2004	12.3	6.4	5.9
1974	24.8	7.3	17.5	2005	12.4	6.5	5.9
1975	23.0	7.3	15.7	2006	12.1	6.8	5.3
1976	19.9	7.3	12.7	2007	12.1	6.9	5.2
1977	18.9	6.9	12.1	2008	12.1	7.1	5.1
1978	18.3	6.3	12.0	2009	12.0	7.1	4.9
1979	17.8	6.2	11.6	2010	11.9	7.1	4.8

Source: 1. Department of Population and Employment Statistics of National Bureau of Statistics of China, China Population and Employment Statistics Yearbook, 2011, China Statistics Press; 2. Department of Comprehensive Statistics of National Bureau of Statistics of China, Comprehensive Statistical Data and Materials on 55 Years of New China.

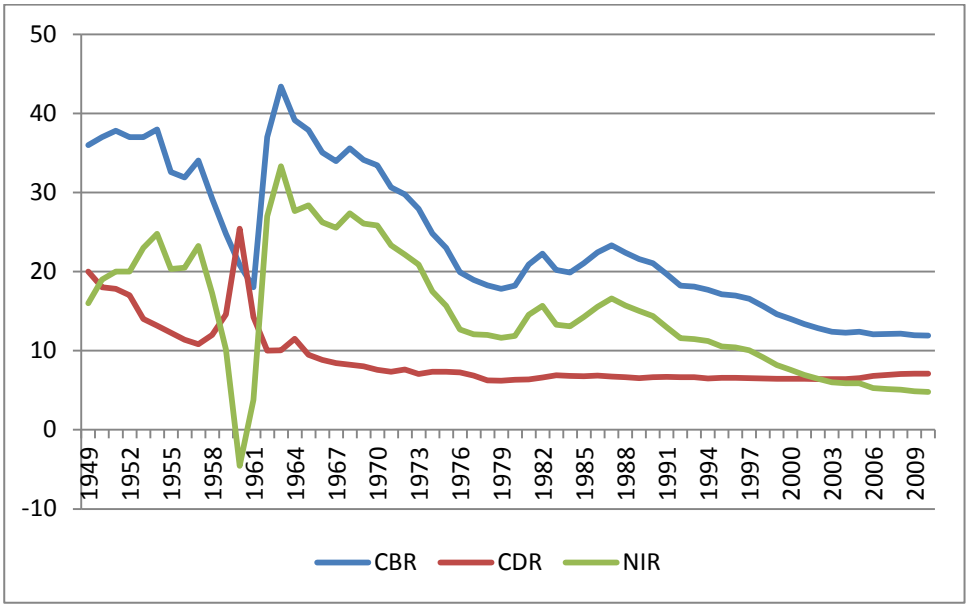


Figure 2.4. Crude Birth Rate, Crude Death Rate and Natural Increase Rate 1949-2010 (per thousand).

The Infant Mortality Rate (IMR) has dropped rapidly over the last four decades, with the greatest reduction occurring in the 1950's and 1960's. This is attributed to efforts aimed at strengthening maternal and child health care through an expansion of health systems incorporating modern delivery methods, professional training to midwives and vigorous efforts to prevent infectious diseases among infants (Peng 1991, Peng and Guo 2000). In 1954, the reported IMR was 138.5 per one thousand live births which declined from 200 per thousand before the liberation. In the mid-1970s, the IMR dropped to 47.04 per thousand. From 1950 to 1980, the average annual rate of decline in China's infant mortality rate was more than 5 per cent, faster than the average decline in the level of developing countries over the same period (2.5 per cent). Until 2000, the IMR dropped to 32.3 per thousand. Population life expectancy at birth in China showed large increases within a short period of time, from about 40 years in 1953 to 68 years in 1982 and 75 in 2010 (table 2.3).

China experienced a period of high fertility in the 1950s and 1960s with the total fertility rate (TFR) of about 6 children per woman. As illustrated in Figure 2.5, during the crisis and famine period 1958-1961, there was a large drop in fertility and excess

mortality. This period of crisis was followed by a recovery period in which the fertility rate increased rapidly and reached a peak in 1963 because of compensatory or replacement childbearing. The high level fertility persisted throughout the decade, until the beginning of 1970s. As it is shown in Figure 2.5, from 1970 onwards fertility declined rapidly to an average of about 2.7 children per woman in 1980 and went below the replacement level in 1990 with 2.0 children per woman.

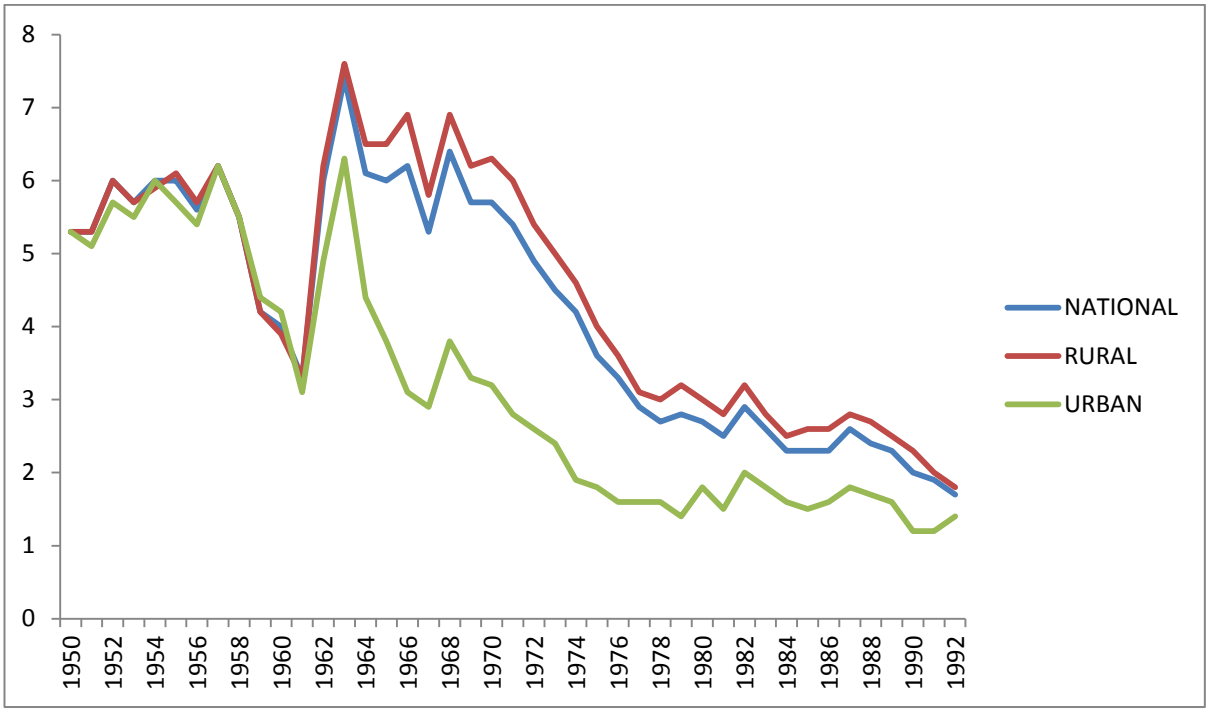


Figure 2.5. Total Fertility Rate by Rural and Urban Areas.

The notable feature of Chinese population, historically, is the large population size and rapid growth (Table 2.3). China conducted its first census in 1953 and a total population of 540 million in 1949 was estimated for 29 mainland provinces, autonomous regions and municipalities. The Fifth census reported that in 2000, total population of the Chinese mainland's 31 provinces, autonomous regions and municipalities was 1.27 billion. Within a span of 51 years, the total population increased by 730 million, an increase of 1.4 times the average annual growth of 14 million, with an average annual growth rate of 18 per thousand. Though fertility in China has been reduced to below-replacement level, a large increase of population continues as a result of the momentum

of population growth. The second feature of the population is its relatively lower level of education. According to the World Education Report (UNESCO 1998), on average, the number of students in higher education in the world was 1434 people per 100,000 in year 1995, including 4110 people in developed countries and 824 people in developing countries. The number was only 461/100,000 people for China. China is not only far behind the developed countries, but only about half the average level of developing countries. Although there was a rapid development of China's higher education during 1995-2008, compared with the world average, the gap is still large. The third characteristic of the Chinese population is that the majority of the population live in rural areas, with low rate of urbanization. The first census shows that only 13 percent of the total population lived in urban areas in 1953, after 60 years in 2010, still less than half lived in urban areas. Figure 2.6 shows the process of urbanization. Before the economic reform, 1949-1979, the figure was under 20 per cent. After 1979, it was increasing by small steps, up to 49.7 per cent in 2010. Globally, more people live in urban areas than in rural areas, with 54 per cent of the world's population residing in urban areas in 2014. In 1950, 30 per cent of the world's population was urban (United Nations 2014).

Table 2.3. Basic Population Statistics from the National Population Censuses Held in 1953, 1964, 1982, 1990, 2000 and 2010 Respectively

Item	1953	1964	1982	1990	2000	2010
Total Population (10 000 persons)	**58260**	**69458**	**100818**	**113368**	**126583**	**133972**
Male	30190	35652	51944	58495	65355	68685
Female	28070	33806	48874	54873	61228	65287
Sex Ratio (female=100)	107.56	105.46	106.30	106.60	106.74	105.20
Average Family Size (person/household)	**4.33**	**4.43**	**4.41**	**3.96**	**3.44**	**3.10**
Population by Age Group (per cent)						
0-14	36.28	40.69	33.59	27.69	22.89	16.60
15-64	59.31	55.75	61.50	66.74	70.15	74.53
65 and Over	4.41	3.56	4.91	5.57	6.96	8.87
Nationality Population (10 000 persons, per cent)						
Han Nationality	54728	65456	94088	104248	115940	122593
per cent to Total Population	93.94	94.24	93.32	91.96	91.59	91.51
Minority Nationalities	3532	4002	6730	9120	10643	11379
per cent to Total Population	6.06	5.76	6.68	8.04	8.41	8.49
Population with Various Education Attainments						
Per 100 000 Persons (person)						
Junior College and Above		416	615	1422	3611	8930
Senior Middle/Secondary Technical School		1319	6779	8039	11146	14032
Junior Middle School		4680	17892	23344	33961	38788
Primary School		28330	35237	37057	35701	26779
Illiterate Population and Illiterate Rate						
Illiterate Population (10 000 persons)		23327	22996	18003	8507	5466
Illiterate Rate (per cent)		33.58	22.81	15.88	6.72	4.08
Population by Residence (per cent, 10 000 persons)						
Urbanization rate	**13.26**	**18.30**	**20.91**	**26.44**	**36.22**	49.68
Urban Population	7726	12710	21082	29971	45844	66557
Rural Population	50534	56748	79736	83397	80739	67415
Life Expectancy(year old)	**40.3**	**57.8***	**67.77****	**68.55**	**71.40**	**74.83**
Male	39.8	56.3*	66.28**	66.84	69.63	72.38
Female	40.8	59.3 *	69.27**	70.47	73.33	77.37

Note: 1.Standard reference time of national population census in 1953, 1964, 1982 and 1990 was zero hour of July 1st, and in 2000 and 2010 was zero hour of November 1st.
2.Total population from the national population censuses include servicemen. The servicemen are listed as urban population in population by residence.
3.Illiterate population of 1964 National Population Census referred to the population aged 13 and over who are unable to read. Illiterate population of 1982, 1990, 2000 and 2010 National Population Censuses referred to the population aged 15 and over who are unable or have difficulty in reading.
4.Data with "*" in this table are of 1965;'**'are of 1981.
Source: National Bureau of Statistics of China, China Statistical Yearbook, 2011, China Statistics Press.

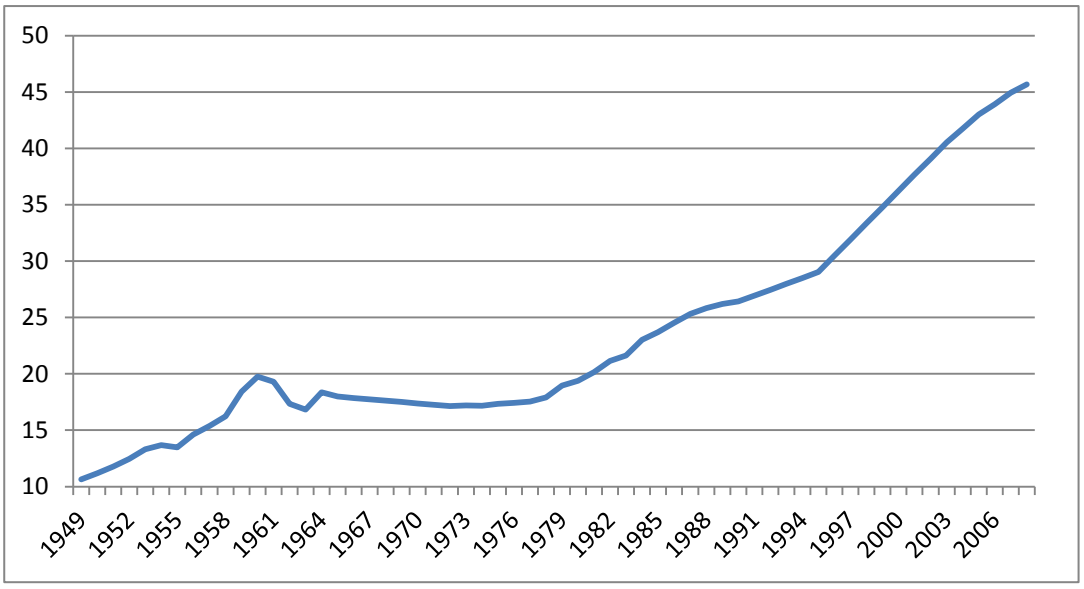


Figure 2.6 Percentage of Urban Residence from 1949-2008.
Resource: NBS 2010.

2.5.3 FAMILY PLANNING POLICY CIRCLE IN CHINA

I. Political and economic settings

To better understand the family planning policy formation, implementation and compliance, it is necessary to review its specific political and economic settings.

A. The centralised political system and state-society relationship

Since 1949 China has been a socialist country, governed by the Communist Party. Currently Party membership reached 78 million, accounting for about 6 per cent of population. The organizational design of the political system was borrowed from the Soviet Union and the imperial system of ancient China, with principles of centralized

control and bureaucratic administration hierarchy. For the role of ideology, there is little room for private and individual interests as well as organized opposition (Saich 2011).

China has 22 provinces, 5 autonomous regions, 4 municipalities and 2 special administrative regions. The Governmental system has five main levels below the centre: provinces (provincial level municipalities, such as Beijing and Shanghai); prefectures, counties, townships; and villages. Although villages are not designed as an official level of state organization, they function de facto as the most basic unit of government. The Communist Party of China (CPC) controls all layers of government by giving broad policy direction - the 'Party line', party members being ministers/local officials, making appointments and promotions and maintaining media controls. The National Congress of the CPC meets every 5 years to appoint all senior officials and set major policy. One of the characteristic of Chinese communism is the leadership doctrine by which the party elite are able to exert significant power over the policy decisions of governments (Chen and Lee 2008). In principle, there are three tiers in policymaking: Politbureau and its Standing Committee, Leading small groups (LSGs), relevant party departments and government ministries.

The relationship between the state and society has changed over time (Saich 2011; Lieberthal 1995; Perry 1994). During the Mao Zedong period (1949-1976), the state dominated society. The state assumed the role of educator and defining correct ethical values on the basis of the prevailing interpretation of Confucianism. China's traditional culture viewed state and society as constituting a moral and ethical unity inseparable from one another, and the state's interest always overweighing individual interests. The use of education to inculcate 'correct' ideas, for instance to love the party and the nation, was part of the government policy. The local official was to embody and proselytize the values and the masses were expected simply to follow the examples provided for them. Mass mobilization and campaign movements were widely used, e.g. 'later, longer, fewer' campaign. Those deemed guilty of anti-social behaviour and associated with a

lack of loyalty were criticized and their names were posted in public places and remained there until they had shown remorse for their acts.

State-society relations in post Mao era are more negotiable (Dumbaugh and Martin 2009; Liou 2000). When Deng Xiaoping returned to power in 1970s, though limiting the extent of significant political change, the economic reforms subsequently introduced have radically reduced the capacity of the state to intervene in society. The economic reforms launched by the CPC in December 1978 have led to a relaxation of party control over the economy, society and ultimately over public discourse. The government has gradually developed a new legal system and promulgated many laws and regulations because of limitation of political supervision and the decline of the traditional control mechanisms during this transition period. The changes in the state-society relationship also include that political participation was required in Mao's era, while now is more optional; in Mao's era, mass mobilization campaign ('mass line') is the major mode, while now rejection of mass mobilization is the mode of political participation and individuals may express opinions and participate more through regular, official channels – hotlines, letters to newspaper editors, etc. although some controls remain.

B. Planned economy and planned childbirth

Beginning of the early 1950s, economic planning was introduced in China that is modelled after the planning system of the Soviet Union (Chen 2002). Rather than by a market mechanism, management of the economy was undertaken through administratively and politically hierarchical means - commands, directives, targets and regulations (Chow 2004, 2011). In order to limit the discretion of subordinate operational units, the firm's production targets (planning and quotas) are set by higher directive. A variety of monitoring mechanisms are applied to ensure the interests of economic actors within the structure coincide with those of superiors or of the overall leadership. In the planned economy, all production units have annual and five-year

plans for production with specific output quotas. Meeting those tasks is the basic assignment of the unit, and success or failure has political as well as economic consequences. The first Five-Year Plan of China was initiated in 1953-57. Birth planning has been the part of the plan since early 1970s.

The transition to a socialist market economy began in 1978 when Deng Xiaoping introduced his programme of "Socialism with Chinese characteristics" (Chen 2002). The new policies revolved around the promotion of market mechanisms to deal with the inefficiencies of allocation and distribution that occurred within the central state planning system. Initial reforms in decollectivizing agriculture and allowing private businesses and foreign investment in the late 1970s and early 1980s later led to large-scale radical reforms, consisting of partial privatisation of the state sector, liberalisation of trade and prices, and dismantling of the "iron rice bowl" system of job security in the late 1990s. Since the beginning of Deng Xiaoping's reforms, China's GDP rose from some 150 billion USD to more than 1.6 trillion USD in 2004, with an annual increase of 9.4 percent. However, in doing so, Deng Xiaoping remained committed to the centralized control and the one-party state central to Leninism. It is worth to notice that rapid growth in the Chinese economy did not occur until after 1990, years after the ‘later, longer, fewer’ and strict one-child policies were implemented (Figure 2.7).

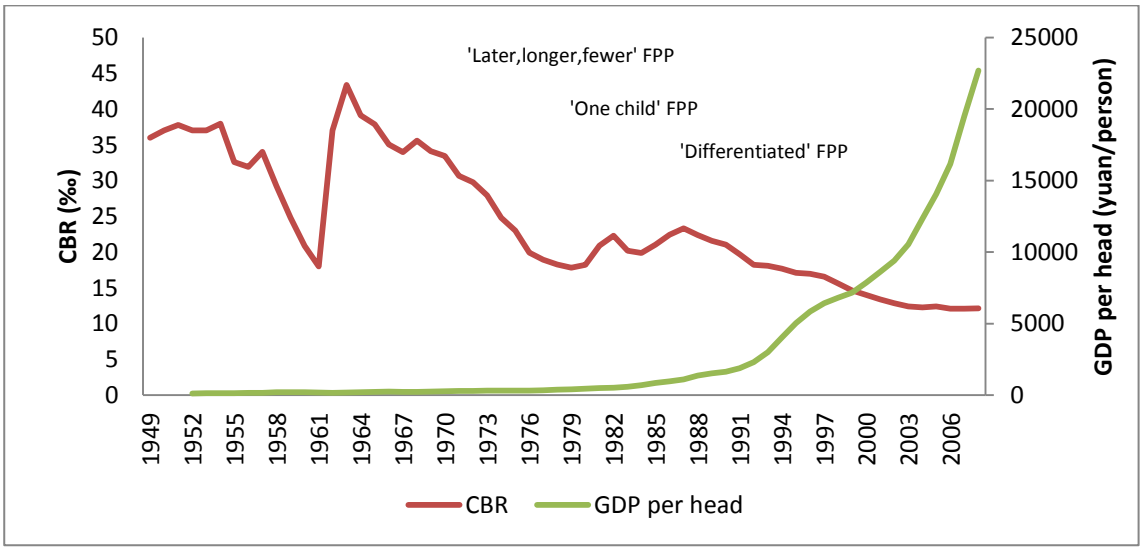


Figure 2.7 Crude Birth Rate (CBR) and Gross Domestic Product (GDP) per Head from 1949-2008. Resource: National Bureau of Statistics (NBS) 2010.

The initial idea of family planning came from Mao Zedong in 1950s, which inferred the Marxist conception and believed that like material production, human reproduction should be properly integrated into a fully planned socialist society and human procreation and material production must be in balance (Lu and Zhai 2009; NPFPC 2007). The ideological bases are the two ideas of Marx and Engels: Marx's view that laws of population are historically specific and Engels' contention that communist societies may control the production for people if called upon to do so. Yet in seizing on these points, they ignore the central notion of Marxist theory that population patterns are shaped by the structure of society (McQuillan 1982). Similar ideas of family planning were proposed by Ma Yinchu, an economist and former president of Beijing University, who proposed a new theoretical perspective to understanding population change in China (Ma 1979). The key proposition was that overpopulation and inadequate capital would inevitably hinder economic development in China and stressed the necessity of birth control to decrease consumption and thereby increase the accumulation of economic capital. He also suggested integrating population into the national socio-economic Five-Year Plan. However, Ma's arguments invited serious ideological criticisms which eventually led to the dismissal from public life till the end of 'Culture Revolution' in 1976, the same year of Mao Zedong's death.

From the early 1960s onwards, the logic of centralized economic planning provided the rationale for population control plans. The principle that child-birth should be planned in accordance with society's needs was gradually agreed by all parties. The population planning targets were not inserted into the 5 year economic plans until the early 1970s, but once inserted they began to be vigorously enforced. By the end of 1975, population goals were redefined as part of the centralized state plan and the crucial prerequisite to successful economic planning. This meant applying to birth control goals the same target-oriented approach in the material sector, where numerical targets were routinely used to set production levels and determine standards of performance in production units. Family planning is thus considered the primary obligation of the socialist state effort rather than an individualized process of choosing whether and when to have children.

The planned economy was an experiment destined to fail; however, birth planning strategy continues to be practiced up to today. Deng Xiaoping set forth the goal of turning China into a 'well-off' (xiaokang) society by 2000, with a per capita income of $1000 (later changed to around 800 U.S. dollars). Population planning resulted in an equation of intervention: that what could not be achieved through economic policy levers could be accomplished through planned population growth (Greenhalgh 2003; Tyrene 2006).

C. International response

As China set out its population control programme in the early 1970s, concerns in the international community were at their peak. Population activists warned that development in the Third World would be impeded by population growth and urged the aggressive implementation of family planning programmes and contraceptive use even in the poorest parts of the world to achieve the goal of zero population growth worldwide. Paul Ehrlich's forecast highlighted the explosion of a population bomb so severe that coercive methods from fines for excess children to mass sterilization efforts

were acceptable (Ehrlich 1968). Garret Hardin argued for the use of mutually agreed-upon coercion and for a lifeboat ethics that warned about the adverse effects on human populations of trying to save the drowning (Hardin 1968). It was no coincidence that China's turn to aggressive birth planning occurred in this international context. Some researchers believed that China's strategy for population control has been influenced by a western-led discourse on population control (Greenhalgh 2003; Tyrene 2006).

II. Problem identification and rationale of state intervention

As we described earlier (2.5.2), China's population grew rapidly in the 1950s and 1960s. By the early 1970s, China's population growth was already starting to challenge resources (Lu and Zhai 2009). During this period of time, series mistaken economic and political decisions such as the Great Leap Forward, the establishment of rural people's communes and the Cultural Revolution almost caused the national economy collapse. The contradiction between total population and economic development became unprecedented (Peng 1991). Rather than reform the economic system, the leadership focused ever more urgently on reducing population pressures. From the early 1970s, the country launched the 'Later, longer, fewer' family planning campaign.

By the end of 1978, China's birth control policy seemed to have been successful in slowing population growth, with a dramatic decline in fertility rates. However, the figures were still in excess of the target set by the government. According to the government's long-term plan, the per capita GNP should be increased from about 250 US dollars in 1979 to 800-1000 dollars by the year 2000. To achieve this goal, the population target by the year 2000 was set at 1.2 billion based on a demographic projection (Song et al 1985; NPFPC 2007). Accordingly, 'one child' FPP was announced. The major motivation behind the policy was economic considerations. Some researchers argued that the policy was based on politics and simplistic calculation, rather than on necessity (Greenhalgh 2003; Basten and Jiang 2014).

Chinese leaders saw population control as a central part of economic growth planning. The state's role in birth planning is not to be viewed as an invasion into private matters because private and public interests are considered inseparable (Tyrene 2006).

III. Political ideologies toward population control

The opinions and attitudes of the top leaders have a strong influence on national policy-making in China (Lewis 1963, 1970). Since 1970s, all high ranking state leaders in China had consistently emphasized the importance of birth control and family planning (Tien 1984; NPFPC 2007). We will highlight opinions from Chairman Mao Zedong (1893-1976) and Mr. Deng Xiaoping (1904-1997) who were supreme leaders in modern China. Mao Zedong formally inaugurated the People's Republic of China in 1949. He played an extremely important role as an ideologist and an innovator until his death in 1976. Deng Xiaoping, the second generation of Chinese leadership, is credited with developing China into one of the fastest-growing economies in the world for over 35 years and raising the standard of living of hundreds of millions of Chinese. Their views of birth control and family planning have greatly influenced the national policy.

A. Population policy strategies during Mao Zedong's regime (1949-76)

Mao Zedong was first known to have expressed his ideas on population in 1949, when the Communist Party took over the national power. He declared that to have a large population "*is a good thing*" for China, and "*even if China's population multiplies many times, she is fully capable of finding a solution, the solution is production*." In this declaration, he also proposed the famous thesis that "*among other things people are the most precious of all things in the world"*. (Lu and Zhai 2009 page962) In 1958, when he launched the Great Leap Forward, he expressed the large population as the 'decisive

factor' in the Leap. A large population was a good thing and that China could control its population growth when the total population reached around seven or eight-hundred million.

Mao Zedong first proposed the concept of family planning in 1956. His conversation with women's delegation from former Yugoslav underlined "*couples should have a family plan about the total number of children of lifetime. Such plan should be integrated with the national five-year plan. At present, China's natural population growth is 12 to 15 million. We have made our production planned, while reproduction of humanity is still unplanned. Why not we also make plans for reproduction of humanity? I believe it is possible*. " (NPFPC 2007 page23)

In a government draft directive called 'National Programme on Agricultural Development' which was released in 1956 and reportedly formulated and drafted under his direct personal guidance, birth control for the first time appeared in an official government document: "*It is necessary to publicize and promote birth control and planned childbirth in all densely populated areas*." (NPFPC 2007 page25)

In February 1957, in his speech to the Supreme State Conference "*we have this large population, it is a good thing, but of course it also has its difficulties……in order to carry out family planning programme, the government may need set up a department or a committee of birth control as a government agency. None government organization can also be founded. Because of the technical issued, financial support and propaganda is needed*. " (NPFPC 2007 page25)

Several months later, Mao once again endorsed birth control in his October speech to the enlarged Third Plenary Session of the Eighth Central Committee of the Chinese Communist Party. He directed that family planning should be promoted particularly in

densely populated regions. He said that "*as far as procreation is concerned, the human race has been in a state of total anarchy and has failed to exercise control…….there should also be a ten-year programme for family planning……and a complete realization of family planning in the future*." (NPFPC 2007 page25)

In January 1958 in his speech to the Supreme State Conference "*we are calling for birth control, but we do not have enough contraception and publicity is weak. The majority of farmers are illiterate and practicing early marriage. Simply we cannot force them to control the childbirth. Human's still lack capacity to master the reproduction of themselves……Birth control need do lots of work of information, education and communication. I commend birth control and family planning*." (NPFPC 2007 page26)

In 1971 the State Council issued a directive which stated among other things that birth control is an important matter that Chairman Mao has advocated for many years. Mao's quote, "*to allow anarchy in human reproduction is not to be tolerated, it is necessary to practise family planning*", was cited as the guideline of the campaign. It is also said that in 1973 Mao suggested the establishment of the State Council Family Planning Office. Furthermore, Mao indicated that simply making the contraceptives available free of charge was not enough. He asked family planning staff to deliver contraception to people's homes. At the end of 1974 Mao gave the instruction to promote the national economy and slow down population growth. '*Population growth must be controlled*." (NPFPC 2007 page89)

We can see that in the early years, Mao's views for the population issue were very optimistic. Later, taking a more realistic view, his opinion gradually inclined towards the advocacy of birth control. There can be no doubt that Chairman Mao's opinions facilitated the formulation and implementation of the Chinese family planning policy.

B. Population policy strategies during Deng Xiaoping's regime (1976-97)

Deng Xiaoping launched new era of reform after he came back to power after Mao's death. He set forth the strategic goal of China's economic development, not only raised the total national indicators, but also per capita ones. He designed famous 'three-step' strategic vision to achieve basic modernization, which has per capita indicators in each step. To achieve the target of each step, economic growth and birth control must be addressed at the same time.

When he met with Ohira Masayoshi, the prime minister of Japan, on December 6, 1979, Deng Xiaoping used xiaokang (well-off) to describe Chinese-style modernization and set 'xiaokang' a target of per-capita GDP of 1,000 US dollars. (NPFPC 2007 page91) In April 1987, reflecting on his paper "drawing on historical experience, to prevent erroneous tendencies," Deng Xiaoping presented three step goals: "*Step one of our plans was to double GDP from 1980 and increase the per capita GDP from 250 U.S dollars to 500 U.S dollars. Step two is to double per capita GDP and reach 1000 US dollars by the end of the century. To achieve this goal means that we enter the well-off society from a poor China. Given the total GDP are more than one trillion US dollars, there will be a great increase in the power of the country, even though per capita indicator is still low. Step three is more important one, in the next 30-50 years, reach per capital GDP about 4,000 U.S dollars. By that time China will reach the level of moderately developed countries. This is our ambition. The goals look not high, but it is not easy to achieve*. "(Lu and Zhai 2009 Page980)

In 1980s, Deng Xiaoping strongly reiterated the strict family planning policy. "*We unswervingly adhere to the family planning policy*" he said. "(Lu and Zhai 2009 Page981)

Strengthening the socialist legal system is an important part of Deng Xiaoping's view. He was one of the first leaders to propose legislation to control population growth. March 1979, Deng Xiaoping on the Politburo meeting said "*population growth should be controlled, in this regard; it should establish some law limiting population growth*." 1982 revised People's Republic of China Constitution provides that "*The state promotes family planning so that population growth may fit the plans for economic and social development. Both husband and wife have the duty to practise family planning."* (Lu and Zhai 2009 Page982)

Deng Xiaoping was the first top leader to pursue an active birth control programme. In August 1953, he indicated the Ministry of Health to correct birth control restrictions, prohibiting the practice of contraception and appliances imported, and urge the document issued "Regulation of Contraception and Abortion". In May 1954, he instructed '*I think contraception is absolutely necessary and beneficial*.' February 1957 in a conversation about birth control, he illustrated that "*birth control is not a small issue, which involves improving the lives of our people in long-term. Now China annually increases population 15 million. If this trend continues, there is no way to improve our living standards. Our population size is already six hundred and fifty million, and if the country's population at the end of the Third Five-Year Plan stable at 700-800 million, is a major victory in the birth control. Ministry of Light Industry plans to produce condoms. If they spend 10 million yuan and consume 1000 tons of rubber, it can offer the products to the whole country free of charge. Propaganda Department should hurry up for the editorial about birth control. The message should be reaching every household the same as the Patriotic Health Campaign. Technical guidance should be strengthened to the community. Hospital guidance should be adjusted to better carry out birth control."* (NPFPC 2007 page20)

IV. Key instruments of family planning policy: highlights and summary

Instruments of family planning policy include population plans, campaigns, contraceptive services, laws and regulations and incentives and disincentives.

A. Population plan and family planning responsibility system

China's population plan began in the early 1970s. Since 1973, the national economic and social development annual plans and five-year plans have integrated population indicators such as population growth rate and number of total population. Population plans became more institutionalized in 1980s. Meanwhile, the local authorities also made their annual and five-year population plan accordingly (NPFPC 2007). Table 2.4 shows some indicators of population planning by 1980.

Alongside the population indicators are proposed goals which played positive role in the implementation of family planning policy. But the statistics showed that these goals have not been achieved. The population growth rate was 11.6 per thousand in 1979 and 11.9 per thousand in 1980, both higher than the planned target of 10 per thousand. The annual growth rate was 14.3 per thousand in 1985, much higher than the planned target of 5 per thousand. One possible explanation for the increasing growth rate in 1980s is that the government revised the marriage law in 1980, lowering the regulated minimum marriage age to 20 for females and 22 for males which contradicted the requirements of the Later Longer Fewer FPP. Female mean age at first marriage quickly dropped 1.3 years by 1984 (Banister and Harbaugh 1994). There was a bunching of first and then second births to young people from several different cohorts marrying at the same time. Another reason is that after 1984, the strict one-child policy started to be relaxed, most women in rural could have the second child if her first child is a girl.

After setting up the target of total population size by the end of twenty century, the State Family Planning Commission was appointed in 1981 by the State Council to take charge of the national and regional population plan.

Table 2.4. Population Plan Indicators

Population indicator	Target	Official document	Institution
Natural population growth rate	by 1975, drop to around 10 per thousand in urban areas and below 15 per thousand in rural areas.	"Report on National Economic Plan" – 1973	the State Planning Commission
Natural population growth rate	1976-1980, drop to around 6 per thousand in urban areas and below 10 per thousand in rural areas	"Report of the National Health Conference" – 1975	Approved by the State Council
Natural population growth rate	within three years, drop to below 10 per thousand	"Briefing Report of National Family Planning Work Conference" – 1978	Approved by the State Council
Natural population growth rate	by the end of 1979, drop to about 10 per thousand by 1985, drop to about 5 per thousand	"Government Work Report" – 1979	the State Council
Natural population growth rate	by 1985, drop to about 5 per thousand by the end of twenty century, drop to zero growth	"Report of Current Economic Issues from Presendent Li Xiannian"–1980	the CPC Central Committee
Total population size	by the end of twenty century, about 1.2 billion	"Open Letter to the General Membership of the Communist Party and the Membership of the Chinese Communist Youth League on the Problem of Controlling Population Growth " –1980	the CPC Central Committee

In the early 1990s, the Central Committee of the Chinese Communist Party and the State Council introduced the family planning responsibility system. The system requires that the heads of Party organizations and governments in all provinces, autonomous regions and municipalities take full responsibility for implementing their local population plans, integrating population plans with their social and economic development plans, and giving priority to the family planning programme. Government at all levels is to implement and improve the responsibility system of population target

management, and leaders of Party committees and governments at all levels are personally responsible for the accomplishment of their population plans. Failure to meet the population control targets may be subject to some kind of penalty, such as withholding of a bonus, demotion or dismissal.

The yearly plans for the family planning programmes at all levels should be worked out according to the national family planning programme, which was developed according to the national five-year population plan and long-term target. These programmes are evaluated and assessed each year primarily on the basis of quantitative measurements such as the number of births, the crude birth rate, the contraceptive prevalence rate and the rate of planned births etc.

There is little doubt that the responsibility system has strengthened leadership in implementing the policy, mobilizing resources and co-ordinating activities for the family planning programme.

The input by governments at all levels for family planning increased through the early 1990s, from 1.5 billion yuan in 1991 to 2.7 billion in 1995. It was estimated that the per capita spending on family planning exceeded 2.6 yuan in 1995 and reached 4 yuan by 2000. However, the strong emphasis on meeting the target has also resulted in coercion and statistical falsification.

B. Family planning campaigns

As we mentioned in section 2.5.3, mass mobilization campaigns were widely used in Mao Zedong's regime. Family planning campaigns share the characteristics of the extent of administrative rigour. The State's intensive and prolonged effort was to alter popular beliefs and consciousness about relationship between population and

development and the role of the state in childbearing decisions. Propaganda was used to associate the desire for a multi-child family with backwardness and ignorance and to link the small family to patriotism and modernity. More importantly, provision of contraceptives were expanded extensively (Greenhalgh 1990, 2003). There were three government launched family planning campaigns from 1950s to 1970s – first two mainly targeting on the urban population, the third one covering the whole population except for the ethnic minorities (NPFPC 2007; Poston and Bouvier 2016).

The first family planning campaign (1956-58) started in 1956. Birth control depended largely on public health organizations and staff. The Ministry of Health was fully responsible for this issue. Newspapers and periodicals were utilized to disseminate the birth-control knowledge. The People's Daily published its first editorial article on birth control in March 1957. Major mass organizations, such as China's Women's Federation and the All China Federation of Trade Unions, were all involved in the campaign (Peng 1991). Late marriage was widely publicized as a means of reduction population growth, although the rational centred on the mother's health and changing the traditional family institution. The supplies of contraceptives were expanded and the sale price was reduced. Restrictions on induced abortion and sterilization were relaxed. Despite strong opposition, clinical abortion was allowed to be carried out up to the tenth week of pregnancy, independent of the age of the pregnant woman or the number of her children. The Chinese Medical Association set up a Birth Control Technical Guidance Committee to co-ordinate research on contraception and to provide technical guidance.

The second birth-control campaign (1964-66) started when the compensation birth emerged after the Great Leap. Compared to the first one, this campaign emphasized more about the masses and the nation's interest rather than maternal and infant's welfare. Since government and society had to provide maintenance, education, and employment, family planning was regarded as serving the health and welfare of the entire people and socialist construction. The State Council called on the various localities to promote birth-control measures earnestly and to bring childbearing into the

orbit of development planning. The Family Planning Staff Office was set up to take charge of birth control. Soon, corresponding agencies were established at the local levels. Slogans such as 'two children are just right, three are too many, and four is an error' indicated the government's desire to limit the family size. Supplies of contraceptives were distributed free of charge in some areas and under certain circumstances. Restrictions in induced abortion were further relaxed. Contraception could be imported duty-free. Meanwhile, some other relevant social welfare policies were also revised to be in favour of birth control. In many provinces, for instance, birth subsidies were only provided to mothers who had a first or second child; higher order births were no longer eligible for such benefits.

The 'Culture Revolution' in the summer of 1966 disrupted the programme. After 1969, reorganization and restructuring of the Party and the administrative bureaucracy got under way. The government was alarmed by the soaring growth in population, and reactivated the family planning campaign in 1971. Unlike previous campaigns, the goal of the third campaign was very clear – – '*Wan, Xi, Shao*'. The structure of the programme paralleled that of state-planned economic sector, with the family planning organs of the Ministry of Health (MOH) in charge of national oversight and coordination and administrative regions acting as aggregate production units with specific targets to fulfil (Peng 1991). In 1973 the State Council set up a leading group for family planning. Local family planning activities revived with the direct participation and supervision of Party leaders. Population targets were for the first time formally included in national economic planning. Contraceptives were supplied free of charge nation-wide in 1974. Measures aimed at achieving the target of two children per family were limited to ideological education and persuasion. The realization of population targets depended almost entirely on government propaganda and the people's voluntary co-operation (Lu and Zhai 2009). The propaganda conveyed the population thought of Mao Zedong, Zhou Enlai and other top leaders' directives on family planning. Particularly, the speech of Mao Zedong (quoted in 2.5.3 III A) were widely expressed and played important role in promoting family planning participation, despite of the unrest interference of 'Cultural Revolution'.

C. Contraceptive services

In practice, FPP are confined to programmatic attempts to increase the availability of contraceptive services and to convince people that low fertility is in their own, as well as the nation's, best interest. From January 1974 onwards, the country implemented the universal free supply of contraceptives. The products of contraceptives have been enriched ever since. Starting from 1994, the family planning programme has begun to focus on client needs, informed choice of contraceptives, and better quality services (Kaufman et al 2006). In the vast rural areas, particularly the poor areas, efforts are made to assist the people to increase their family income, to help women to advance their economic and social status, and to gradually improve the social security system. All the measures will contribute to creating a favourable environment for the implementation the family planning programme.

Contraceptive services in China are mainly aimed at married couples, especially those who already have a child. Most married couples at reproductive age receive contraceptive services free of charge. Different contraceptive methods are recommended to couples according to the number of children that they already have. The intrauterine device (IUD), for example, is suggested to couples with only one child, and sterilization is recommended to those who have had two or more children and to those who do not want any more births. Unmarried people are usually excluded from the target population for contraceptive services.

D. Family planning laws and regulations

FPP legislation plays an important role in the process of implementation (Tien 1984; NPFPC 2007). Family planning was enshrined in the Constitution of the People's Republic of China in 1978, stating that the State promotes and implements family

planning. In 1982, the revised Constitution had the provisions that the state promotes family planning so that population growth may fit the plans for economic and social development; both husband and wife have the duty to practise family planning.

The first law–Population and Family Planning Law was issued on December 29, 2001. This law is a basic law of family planning, which states that family planning is a fundamental state policy. The law has detailed provisions about regulation of reproduction, technical services for family planning, rewards and social security and legal liability. For instance,

"The State maintains its current policy for reproduction, encouraging late marriage and childbearing and advocating one child per couple. Where the requirements specified by laws and regulations are met, plans for a second child, if requested, may be made. Specific measures in this regard shall be formulated by the people's congress or its standing committee of a province, autonomous region, or municipality directly under the Central Government……. Citizens who give birth to babies not in compliance with the provisions of this Law shall pay a social maintenance fee prescribed by law. …… The State creates conditions to ensure that individual citizens knowingly choose safe, effective, and appropriate contraceptive methods.……Couples of reproductive age who practise family planning receive, free of charge, the basic items of technical services specified by the state."(National People's Congress (NPC) 2002 Page10,11,22)

Three other existing family planning administrative regulations formulated by the State Council include 'Provisions on Social Compensation Fee Management' issued in August 2002, 'Provisions on Family Planning Technical Service Management' issued in June, 2001, and 'Provisions on Family Planning of Migrants' issued in May,2009.

Provinces (autonomous regions and municipalities) formulated their family planning regulation through the Provincial People's Congress in 1980s and early 1990s, though trial regulations on birth planning were enacted by provincial revolutionary committees

or people's congresses in late 1970s. The provincial family planning regulations have been modified in accordance with national law as well as local realities. Each province has detailed provision of population plan management, fertility regulation, incentives and penalties (Greenhalgh 1986; Gu et al. 2007).

E. Incentives and disincentives

China has instituted incentives which include cash rewards and better access to a wide range of social goods for one-child families. Disincentives, in the form of negative sanctions on individuals, couples, or groups, have generally been imposed, taking the form of withdrawal of housing, maternity leave, monetary, or other benefits. The threat of political punishment for violating birth planning was also one of a range of penalties that were adopted and implemented over the course of the decade (Greenhalgh 1986; Gu et al 2007; NPFPC 2007). The incentives and disincentives have been modified since 1970s along with the evolution of family planning policy as well as the socioeconomic development.

The first step toward creating an incentive system for birth planning was the decision to provide a generous vacation period to all who underwent birth control procedures in 1973 (Peng 1991). All individuals undergoing sterilization and all women undergoing abortions or IUD insertions were given paid vacation leave.

Provincial trial regulations on birth planning in late 1970s offered incentives for having only one child and invoked penalties against those who had a third child. Rewards were divided into three categories. First were the rewards for undergoing birth control procedures. For instance, free birth control supplies and devices, as well as free birth control operations, such as abortions, sterilizations, and IUD insertions. Workers and peasants were to receive paid vacations after undergoing a birth control procedure, and bonuses were not to be adversely affected by the vacation time. Second were the

economic preferences to be given to one-child couples. Parents for single child were to receive health care fees total 30-40 yuan per year in urban areas and 400 work points in rural areas, which proximately equivalent the amount money in urban areas. These health subsidies were to be allocated until the child reached fourteen. Anyone who received the bonuses and later had a second child was required to repay the health subsidies received. Single child under age fourteen were also guaranteed preferential treatment in admission to nursery, kindergarten, elementary, and middle schools, obtaining work as an adult, and entering university, other things being equal. Parents of single children were guaranteed retirement income. Workers were to receive the standard retirement pay offered by their unit plus an additional 5 percent, except where such pay already equalled 100 percent of a worker's salary at the time of retirement. Peasants were to receive a monthly subsidy of 3-5 yuan, in addition to any retirement privileges already in effect under local regulations. Third, were housing and grain allotment benefits. In cities and towns, residents who complied with regulations were guaranteed priority in housing; single child couples were guaranteed a housing allotment equivalent to that of a two-child household. In rural areas, couples with a single child were entitled to receive a grain ration equivalent to that for three adults. The trial regulations also outlined penalties for noncompliance. Anyone who exceeded two children had to pay an excess-child fee consisting of 10 percent of the salary of each parent for fourteen years. Exceptions were to be made in cases of twins or multiple offspring resulting from the second pregnancy. In the countryside, where peasant households lived with little or no margin of income beyond subsistence, an economic penalty amounting to 20 percent of a couple's income for fourteen years was an extremely serious threat.

Formal provincial level family planning regulations were enacted in 1980s and 1990s, with detailed provisions to limit unplanned births. For unplanned births amongst urban workers and residents as well as individual business people, the general penalty where the unplanned birth is a second child, involved withholding 10-30 per cent of the couple's annual income for 5-14 years; where the unplanned birth is a third or higher parity, the state could withhold 20-60 per cent of annual income for 7-14 years.

Shanghai's regulation in 1990 stated that 'for unplanned second child, the fine is 3 times of the average annual income of couple (average is based on two years prior to the baby born); for the third or higher order unplanned child, the fine would be 4-6 times'. Hainan's regulations in 1989 stated that for urban residents, an unplanned second child would result in a fine of 2000 yuan in total; for the third or higher order unplanned child, the fine would be 4000 yuan in total. In addition, those families were excluded from hardship assistance and childcare subsidies.

For the peasant, in general, the second unplanned birth would result in a fine equivalent to 10-20 per cent of couple's annual net income for 5-14 years; for the third or higher order unplanned child, the fine would be 20-40 per cent of annual net income. Hainan regulations implemented in 1989 stated those farmers with an unplanned second child would pay a fine of 500 yuan in total; for the third or higher order unplanned child, the fine would be 2000 yuan in total. In addition, those families would not be allocated extra farmland, or increase production contract specifications.

The unplanned birth for the state employees, in addition to an economic fine, would also lead to administrative and disciplinary sanctions, no awards for three years and no promotion.

"The Provision of Social Compensation Fee", issued in August 2002 authorized the provinces, autonomous regions and municipalities to impose specific standards of social maintenance fees. In addition, there are 16 provinces, autonomous regions and municipalities empowered to develop their own implementation details; and another 15 provinces, autonomous regions and municipalities could add further provisions about social compensation fee in their revised Family Planning Regulation.

V. Implementation of family planning policy

A. Institutions for the implementation

Initial implementation of family planning, starting in late 1950s, was conducted by the Ministry of Health, with the specific birth control propaganda and contraception techniques administered by the Maternal and Child Health Division. The State Family Planning Commission was formally established in 1981. By 1984, the country's 28 provinces had set up Provincial Family Planning Commission, followed by the establishment of prefecture level, county level and township level family planning offices. While successful policy implementation depends largely on the acceptability of the policy itself, the maintenance of a large staff of family planning officials and workers has remained essential. There are about 300,000 officials and workers working in the family planning system, of whom more than 200,000 work at the level of townships or below. There are also hundreds of thousands of part-time family planning workers in villages. With a family planning network established, married couples at reproductive age have easy access to family planning services. Meanwhile, by 2013, there were 900,000 branch associations under the China Family Planning Association throughout the country with more than 50 million members assisting the implementation of the family planning programme (China Family Planning Yearbook Editorial Office 1993). The Commission was dissolved and superseded by the National Health and Family Planning Commission in March 2013, during the first session of the 12th National People's Congress.

B. Adherence to and compliance with family planning policy

Despite strong disagreement with state policy and birth restrictions, citizens have not openly resisted them. The lack of collective action may reflect the widespread acceptance (Hardee and Banister 1988). The possible explanation is firstly, tight fertility

control applied to all childbearing age couples, whether they were senior officials or poor peasants. Moreover, party members, family planning officials, and rural cadres were asked to set an example by taking the lead in embracing the strict birth limit. No one was left untouched by the policy. Secondly, laws and formal organizational rules and regulations are backed up by specific social sanctions and designated agents assigned the responsibility and authority to enforce the rules. There are a variety of social controls and sanctions which are intended to induce to adhere to or follow rules, ranging from coercion to more symbolic forms of social approval or disapproval, persuasion, and activation of commitments. Thirdly, some individuals may not know the consequences of policy compliance and follow policies because they are given, taken for granted, or believed generally to be right and proper.

Resistance to family planning policy can be evasion, cover-up, collusion and confrontation (Kaufman et al 1989; Greenhalgh 1994; Tyrene 2006). Evasion became a major problem as the tight network of controls over mobility and food supply that had kept peasant labourers tied closely to the villages during the Maoist era began to erode. To encourage the development of economy, restriction on peasant movement were progressively relaxed, making it more difficult to monitor and control childbearing age couples. By the end of the century, the number of migrants had risen to more than 140 million. The enormous number of the mobile population vastly complicated the job of enforcing birth limit. Once rural couples live for long period of time beyond the jurisdiction of their native village or township, local authorities no longer had the ability or the incentive to monitor pregnancy and childbearing. Government drafted effective regulations to curb migrants' excess childbearing, but the efforts made little difference. The regulations required migrants to bring documentation of their birth planning status to their place of employment. Temporary residency permits could not be issued without them. However, with a booming economy and a demand for cheap labour, employers often ignored this requirement and spent little or no effort monitoring childbearing. One of the most pervasive and deeply entrenched strategies for coping with enforcement pressures was cover-up, hiding or embellishing the truth when reporting the results of birth planning work to higher authorities. Collusion occurred in some cases when family

planning cadres assisted because of their sympathy for peasants' childbearing preference, or in other cases, corruption was at work. There are also some cases reporting violence and the threat of violence against family planning officials as opposition to limiting childbirth increased in 1980s and 1990s.

VI. Evaluation of family planning policy

A. Fertility change

The 1979 China's family planning policy had clear demographic goals: to limit the total population size by year 2000 to around 1.2 billion by reducing fertility. During the last four decades, China has experienced a dramatic fertility transition and it is believed that the transition was induced by family planning policy (Tien 1984; Feeney et al 1987; Cai 2010; Chen et al 2009; Freedman and Wang 1993). Fertility was high in the early years of the formation of People's Republic until the late 1960s and thereafter the fertility transition has accelerated. The national TFR declined from 5.7 in 1970 to 3.6 in 1975 and fell further to 2.3 children per woman in 1980. Fertility decreased by more than 50 per cent within a decade. As we saw earlier in Figure 2.4, the early 1980s China's fertility level has fluctuated but remained at a relatively low level. Total fertility rate reached replacement level in early 1990s and decreased continually afterwards to well below replacement in the most recent two decades. The estimates from the 2010 census show that the total fertility rate has now reached 1.19, the lowest level ever in the history.

Fertility transition in urban areas began earlier and progressed faster than in the rural areas. The onset of urban fertility transition occurred around the mid-1960s, reflecting the impact of the second family planning campaign. By the end of 1964, 168 cities nationwide all carried out family planning. Before 1963, the urban birth rate and natural growth rate was higher than that in rural areas. During 1954-1958, average annual urban population birth rate was 39.8 per thousand, while that of the rural was 32.4 per thousand; the natural growth rate of urban population was 31.3 per thousand, while that

of the rural was 20 per thousand. In 1964, as a turning point, the annual birth rate and natural growth rate was recorded lower in urban than those in rural areas, and urban-rural gap continued to widen thereafter. During 1964-1966, the urban birth rate was 32.2 per thousand, 26.6 per thousand, 20.9 per thousand, while that of the county was 40.3 per thousand, 39.5 per thousand, 36.7 per thousand respectively; the natural growth rate of urban population was 24.9 per thousand, 20.9 per thousand, 15.3 per thousand, while that of county was 28.1 per thousand, 29.5 per thousand, 27.2 per thousand respectively. The initial fertility decline began, in general in the rural areas around the time of the launch of China's third family planning campaign in the early 1970s, roughly one decade later than the urban transition.

'Later, longer and fewer' FPP was carried out in 1970s. It effectively curbed the rapid population growth. As we saw earlier in Table 2.2, from 1970 to 1978, the crude birth rate dropped from 33.43 per thousand to 18.25 per thousand, with 45.4 per cent reduction; total fertility rate dropped from 5.8 to 2.7, with 53.2 per cent reduction; natural growth rate dropped from 25.83 per thousand to 12 per thousand, with 53.4 per cent reduce; annual net population growth dropped from 21.14 million to 11.47 million, down 45.7 per thousand.

Marriage continues to be nearly universal especially for women, but women's average age at marriage has increased fairly steadily. Women's marriage age increased from 20.2 years old in 1971 to 22.8 years old in 1978. Early marriage (before 18 years) dropped from 18.6 per cent in 1970 to 3.7 per cent in 1978. Late marriage (later than 23 years) among women increased from 13.8 per cent in 1970 to 48.0 per cent in 1978; the corresponding figures were 40.1 per cent to 84 per cent in urban; and 10.1 per cent to 41.4 per cent in rural. The policy facilitated fertility transition and ended history of high fertility rate in China.

Fertility continued to decline to 17.7 per thousand in 1994. The total fertility rate declined to about 2 in 1994, slightly below the replacement level. The rate of natural increase dropped to 11.2 per thousand in the corresponding years. The urban population practically shifted to a pattern characterised by low fertility, low mortality and low

growth while the rural population started gradually shifting towards this pattern. About 50 million couples of childbearing ages chose to have only one child.

B. Contraceptive prevalence and mix

Family planning programme largely increased contraceptive prevalence in China (Poston 1992; Wang 2012a, 2012b). During the 1970s the contraceptive prevalence rate (CPR) was no more than 60 per cent. It increased to around 70 per cent in the early 1980s and stood around that level in the 1980s, increasing only very lightly from 69.5 per cent in 1982 to 71.2 per cent in 1988. In the early 1990s, the CPR increased further reaching 83.4 per cent in 1992, much higher than the average levels in both developed countries (72 per cent) and developing countries (53 per cent including China) (Peng and Guo 2000). Most couples in China use long-term effective methods, such as the IUD and sterilization, which are strongly endorsed by government policies and regulations. According to the survey, in 1992, the contraceptive mix among Chinese users was 41 percent female sterilization, 12 per cent male sterilization and 40 per cent IUD. Sterilization and IUD constitute 93 per cent of all methods being used, and less than 7 per cent of the contraceptive users use the pill, condoms and other modern or traditional methods. The increase in CPR also led to a steady decline in abortions from about 20 million per year in 1980s to 10 million in 1992. The reported abortion ratio was less than 0.5 per 1000 pregnancies (CFPYB Editorial Office 1993).

C. Socioeconomic and demographic consequences

Family planning policy effectively curbed the excessive growth of population, and brought huge economic benefits, and promoted the development of society (Cai et al. 2001; Zhang et al. 2011; Hu 2006). Since initiating market reforms in 1978, it was estimated that GDP growth averaging about 10 percent a year has lifted more than 500 million people out of poverty (World Bank 2015). With a population of 1.3 billion, China recently became the World’s second largest economy and is increasingly playing an important and influential role in the global economy. Based on Deng Xiaoping's "three-step" development strategy to modernization, the country managed to achieve the

first two goals by 2000. China's GDP reached 1.081 trillion US dollars and 854 US dollars per capita, achieving the intended target of 800 US dollars per. There was a radical shift in the production and supply of goods and people's living conditions showed signs of steady improvement. Overall, China managed to enter a well-off (*xiao kang*) society.

It is reported that from 1971 to 1998, due to family planning policy, there were 338 million fewer births, saving children alimony of 7.4 trillion yuan for the whole society (Lu and Zhai 2009). From 1979 to 1998, China's per capita GDP rose from 418 yuan to 6490 yuan, the level of consumption increased from 227 yuan to 3094 yuan; the corresponding figures without practicing family planning policy would be 363 yuan to 4100 yuan and 197 yuan to 1954 yuan. Moreover, from 1970 to 1997, China's per capita grain output increased from 293 kg to 402 kg, meeting the basic food self-sufficiency. If family planning policy was non-existent, then the country would have faced serious resources (food) shortage. In 1997, China's per capita arable land, forest area, water resources were 1.15 acres, 0.11 hectares, 2275 cubic meters. Without an effective family planning policy, the figure would be only 0.93 acres, 0.09 hectares, 1836 cubic meters. Given the family planning policy, annual incremental growth of the working-age population significantly dropped since 1985. This greatly eased the dilemma of oversupply of labour and reduced the employment pressure. More importantly, it provided a suitable age structure for industrial restructuring and reform of labour and employment system.

Though strict state regulation of childbearing has been the primary mission, family planning policy also encompassed a broad array of family planning services that have contributed significantly to maternal and infant health, as well as reproductive health (Hardee, Xie and Gu 2004). Women’s status continued to improve. The implementation of the population and family planning programme has relieved women from the heavy burdens of frequent births and childrearing. They have more time and energy for learning and taking part in economic development and other social activities. Their rights to marriage, childbearing and contraception have been respected and protected by law.

D. Rapid increase in population aging

Alongside the benefits, there were also imminent negative consequences of the policy. The dramatic changes in China's population structure become clearly visible in China's population pyramid since 1953 (see Figure 2.8). In 1953 and 1964, with fertility levels still high and mortality just beginning to fall, the population structure had a classic pyramid shape, with a wide base and narrow top. The 1982 pyramid's narrowing base reveals the effect of sharp fertility declines in the 1970s. The fertility declines are even more evident in the 2000 and 2010 pyramid. The rapid fertility decline in China has produced a rapidly aging population (Mai, Peng and Chen 2013). Two decades ago, the share of China's population aged 60 and above was only 7.6 percent, and those aged 65 and above constituted only 4.9 percent of the total population. China's 2000 census revealed that the proportion of elderly had risen to 10.5 percent for those aged 60 and above, and 7.1 percent for those 65 and above. Without necessarily a uniform increase in living standards and a social security system comparable to other aging societies, China has become old before it has become rich. While the percentage of the population over 60 is only half that of western industrialized nations, China's per capita income is one quarter to one fifth that of these same countries. There is little doubt that China's aging process will continue to accelerate.

Traditionally, Chinese elderly parents relied heavily on their children for financial support and physical care. The strict family planning policy began when the centrally planned economy was still in place. Therefore, even though the policy removed or reduced the traditional source of support for elderly parents, they could at least count on communes in the countryside and work organizations in urban areas for some economic support. With China's reforming of its economic system societal support has largely disappeared. Welfare provisions from communes and work organizations no longer existed. Only a small portion of the urban population benefits from a socialized pension system. The majority of China's elderly reside in the countryside, and the social scheme is beyond their reach (Yang and Chen 2004, Hu 2006). Recently the government initiated an experimental programme that provides a monthly subsidy of approximately

US$6 to poor rural elderly with only one child. While this costs the government and taxpayers hundreds of millions, it can hardly be considered substantial help (Wang 2005; Jiang et al 2011).

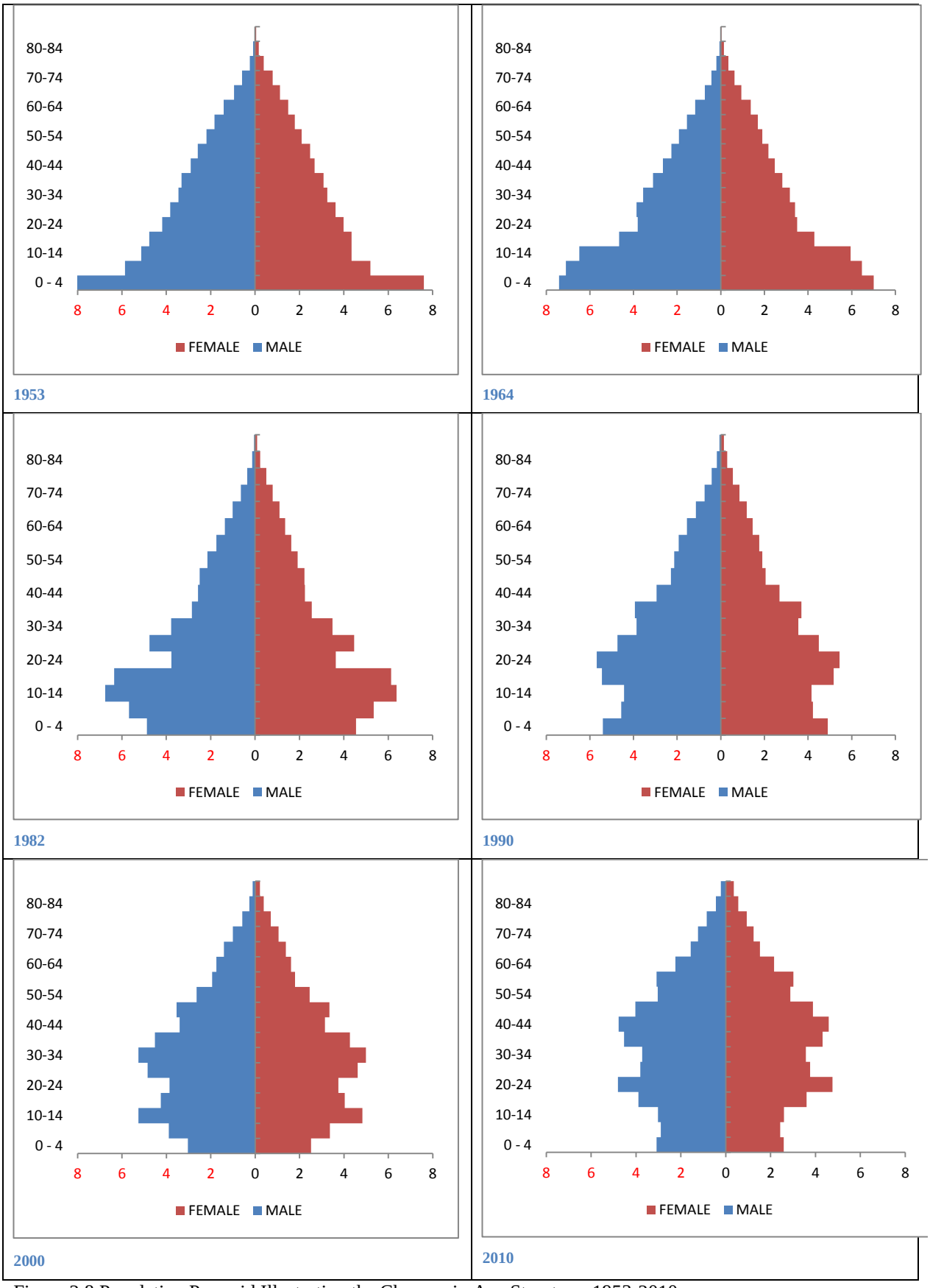


Figure 2.8 Population Pyramid Illustrating the Changes in Age Structure, 1953-2010

E. Imbalanced sex ratio

With the adoption of the one-child policy, an imbalance in the sex ratio at birth emerged that has become increasingly skewed over the past two decades. This is attributed largely to the policy, particularly the gender-specific fertility policy that permitted only rural couples with a first born daughter to have a second child (Arnold and Liu 1986; Chu 2001; Che 2011). In 1982, the sex ratio at birth was 108.5 boys to every 100 girls, already above the normal range of 104–106 boys per 100 girls. After 1982, China's figures rose sharply to 114.1 in 1990, and 117.1 in 1995. The most recent census reported a sex ratio at birth of 119.2 boys in 2000, suggesting over 10 percent excess male births in the population (Cai and Lavely 2003).

The policy contributes to an imbalanced sex ratio in several ways (Gu and Roy 1995; Wang and Gu 2012). Some parents, who have not yet had a son or achieved a balanced sex composition among offspring, resorted to sex selective abortion in order to have the child of the desired sex. At the same time, some girls were unaccounted or 'missing' because they were hidden by their parents from government officials and therefore unrecorded in censuses and surveys (Zeng et al. 1993; Wang 2005). The 2000 census, for instance, revealed more surviving individuals aged 10–14 in 2000 than those counted at ages 0–4 in the 1990 census. It also showed a more balanced sex ratio among the same birth cohorts as time passed. Another possible explanation for the skewed sex ratio is the extent to which baby girls were subject to victims of infanticide, abandonment, or deliberate neglect which can be attributed partly to the country's birth control policy. Goodkind (2015, 2011) argued that skewed sex ratio at birth is largely due to underreporting of young daughters, sex-linked stopping rules (if first child is a boy then no chance for another daughter for rural couples) and other factors (strong son-preference). However, the evidence on whether such FPP increase use of prenatal sex selection is unclear.

The shortage of girls has led to a problem in the Chinese marriage market (Jiang et al 2011, 2013; Poston, Conde and DeSalvo 2011; Tucker and Van Hook 2013). In the early 1980s, 15 percent of illiterate or semi-illiterate male peasants at age 40 were still single, whereas among university educated men the number was only 0.5 percent. In 1990, the share of bachelors among the rural poor at age 40 rose to 19 percent. By 2000, among rural males with the least schooling, 27 percent at age 40 were unmarried, while nationally that figure was only 4 percent. In the same age group, only 1 percent of men with a college degree or higher were bachelors. This concentration of unmarried males among the rural poor was possibly caused by the intensification of son preference as fertility declined in the 1960s and 1970s, eventually resulting in successively smaller cohorts of brides in comparison to grooms; the situation may grow worse as cohorts with increasingly imbalanced sex ratios reach their marriage age.

F. High political costs

To implement the family planning policy against the preferences of the majority of Chinese couples, which is two children per couple, the government has paid a dear cost politically (Tyrene 2006; Wang et al 2012). In the 1980s, there were violent clashes between local birth control officials and peasants that involved the confiscation or destruction of property and physical abuse (Perry 1985). Forced sterilization and induced abortion invited not only hostility and resistance from the population, but also sharp criticism from the international community. Such physical abuses continued into the early 1990s but had largely disappeared by the end of the decade. In the effort to crack down on the physical abuses, China shifted the focus of its birth control programme away from administrative coercion toward encouraging voluntary contraception and providing couples with a wider selection of contraceptive methods. This new programme orientation may have helped to ease the tension between birth control officials and citizens. Open opposition to the policy has turned into subversive resistance. For example, citizens and local officials have coordinated efforts to conceal births in the countryside. In the 1980s, demographic behaviour could be measured with

great detail and accuracy; but by the 1990s, the birth reporting system had literally distorted (Waldmeir 2013; Wang 2005).

To continue a birth control policy that demands the sustained cooperation and sacrifice of many couples, the government needed an increasingly large amount of financial and organizational resources. Government budget allocation to birth control programmes increased 3.6 times in the 1990s alone, from 1.34 billion yuan in 1990 to 4.82 billion in 1998. The rate of increase was even faster than that for economic construction or national defence. According to the Ministry of Finance, the per capita input has increased in recent years from 2.6 yuan in 1995 to 8.9 yuan in 2002 at the central government level. Programmes at local levels are financed by fees imposed on peasants and indirect contributions from rural enterprises and urban work organizations.

Over the family planning policy, China has also created a fast growing bureaucratic sector of birth control officials. In 1980, the year the one-child policy was announced, China had about 60,000 full-time personnel working on birth control down to the level of townships and urban neighbourhoods. By 1995, this number rose to over 400,000, nearly a sevenfold increase. While most government ministries were required to reduce the number of employees by half in the late 1990s, the birth control planning system was able to get away with a cut of only a quarter, keeping 300,000 on the government payroll. Again, this number represents only a portion of the organizational resources devoted to birth control. China's Family Planning Association claims a membership of 92 million, organized into more than a million branches. Birth control policy requires the full attention of the Party and government organizations at all levels, not just those directly involved in implementing the policy and in providing services. Where fertility does not reach the stipulated low level, local officials must spend a substantial amount of their time on the issue, as meeting birth control goals is a major criterion used in evaluating their performance and greatly affects their political careers.

2.5.4 FUTURE POLICY PERSPECTIVES

Demographic situation, combined with the task of administering complex societies has pushed Chinese leaders implemented strict family planning policy for over thirty years. The exuberant social engineering has influenced lives of hundred millions of Chinese people. Based on the official statements, the strict family planning policy still has its necessity (NHFPC 2013a, 2013b), since China still confronts with a series of basic problems including a large population base, insufficient cultivated land, under-development, inadequate resources on per capital basis and an uneven social and economic development among regions. Though fertility in China has been reduced to below-replacement level, a large increase of population continues as a result of the huge momentum of population growth. Despite the relatively low natural growth rate, new increments to China's population have been substantial in recent years, about 14 million per annum, increasingly aggravating the population pressure on China's economy, resources, and environment.

For more than a decade, demographers have been engaged in research to push for a substantial modification of the strict family planning policy (Wang 2005, 2011; Zeng 2007; Cai 2012; Wang et al. 2012; Liu 2013). They found that the strict family planning policy has already done serious harm to Chinese society and needs to be relaxed or abandoned. Two major long-term consequences of family planning policy are aging of the population and a badly skewed sex ratio in the population. The aging burden will weigh heavily on China and the economy and society will feel the negative effects of higher dependency ratios and greater expenditures on elderly care. This ageing during the process of industrialization and urbanization will keep up the pressure to maintain rapid and sustainable growth. Moreover, low fertility is beginning to contribute to sharp increase in wages and labour costs, harming China's economic competitiveness.

Several conditions are now put in place for China to start phasing out the strict family planning policy, particularly the one child limit: low fertility; a new economic environment; a strong and persistent preference for two children among the Chinese population; and the recent success in reorienting the government's birth control programme away from coercion and toward informed choices in service delivery (Winckler 2002; Zeng 2007; Zheng et al 2009; Wang 2011; Cai 2012; Beech 2013). The population growth rate in China has already declined to a very low level. China's current fertility level is likely to be between 1.5 and 1.6 children per couple, substantially below the replacement level, and at a level that promises net reduction in absolute population size in the long run. The planned economy has already become a history. This fundamental shift, along with rapidly increasing incomes and changing aspirations, provides a new framework within which the Chinese plan their economic, social, and reproductive lives. Numerous surveys reveal that most couples would be happy with two children and, for some of them, having a son is critically important. These largely consistent survey numbers show that the government's strict family planning policy is in direct conflict with the desires of the people. Though it still requires couples to limit the number of births, family planning programme has departed from an earlier approach that relied almost exclusively on administrative coercion. Since the mid-1990s the programme has shifted its focus to providing client centred health services.

Few believe that China's current fertility policy, especially the one-child component, should be kept in perpetuity. The questions are of how and when to phase out the old policy. The former National Population and Family Planning Commission (NPFPC) has, since 2013, been merged with the former Ministry of Health, establishing the National Health and Family Planning Commission. The function of drawing up population policies has been transferred to another Commission (National Development and Reform Commission). In November 2013, the new leadership of the Chinese Communist Party (CPC) announced a "softening" of the strict family planning policy: families will be allowed two children if one parent is an only child. Premier Li Keqiang answered the question about lifting the second-child restrictions at a press conference of The Third Session of the 12th National People's Congress. He stated that "currently we

are conducting a comprehensive review of how family planning policy has been implemented. Based on the outcome of this review and taking into account China's economic and social development and changes in our demographic structure, we will weigh both the pros and cons, and make improvements and adjustments to our policy in accordance with legal procedures."(Ministry of Foreign Affairs (MFA) 2015). All these indicate that strict family planning policy is changing underway step by step.

However, given that family planning policy has been part of the core national agenda for the past several decades, the process of change seems not easy. The country is still not as strong and wealthy as China's leaders' desire. The core features of the party-state system remain essentially unchanged (Saich 2011). The officials represent an obstacle to the lifting of the policy and it is common to find the Minister making public statements on the need to keep the policy in place. All these obstacles require political courage and wisdom to gives the long-term and voluntary nature of population reproduction as soon as possible.

CHAPTER THREE

DATA AND METHODS

3.1 DATA SOURCES

Data for this study come from 6 consecutive National Population & Family Planning cross-sectional surveys (name of each survey is not necessarily the same) conducted in 1982, 1988, 1992, 1997, 2001 and 2006 by the State Family Planning Commission of China. The main purpose of the series of surveys is to examine the fertility, contraceptive use and other reproductive health issues of women of reproductive ages (15-49). Retrospective full birth history information is available in all of the surveys, with the notable exception of the 1992 survey which recorded birth histories for only the last four children. All surveys were designed to be nationally representative, but for the exclusion of Tibet in 1982 and 2006 surveys. Further details about the surveys are provided in Table 3.1 whilst data quality is discussed in-depth in Section 3.2 below. Information about the surveys and data quality has also been reported elsewhere (Feeney and Yu 1987; Feeney and Wang 1993; Feeney and Yuan 1994; Morgan et al. 2009).

Data from 1982, 1992, 1997, 2001 and 2006 surveys are self-weighting. The dataset for the 1988 survey provides weights based on sampling fraction of each province. In order to assess the impact of using weights, we compare the fertility outcomes, i.e. Total Fertility Rates adjusted by Parity Progression Ratios (TFRppr) calculated from un-weighted and weighted data. A parity progression ratio (PPR) is a measure normally used in demography to study fertility. The PPR is the proportion of women with a certain number of children who then go onto have another child. The discrepancies of TFR_{ppr} in the targeted years from 1977 to 1987 were all less than 4 per cent. The influence of sample weight on the outcome was negligible. Hence it was decided to present the results from analysis based on unweighted data.

Based on each specific objective of this thesis, data from each survey may be analysed

individually or pooled with the others for analysis. Clarifying the definition, name and coding of each necessary variable in each survey is essential. Renaming and recoding all study variables in each survey has been done to create consistency.

Table 3.1. Survey Characteristics, 1982-2006

	1982	**1988**	**1992**	**1997**	**2001**	**2006**
Survey Name	China's National One-per-thousand Population Fertility Sampling Survey	China's two-per-thousand National fertility survey	Management information system survey	National population and reproductive health survey	National family planning and reproductive health survey	National population and family planning survey
Survey Date	July,1982	July, 1988	October, 1992	October, 1997	August,2001	August,2006
Coverage	National representative (not include Tibet) 28/29 provinces	National representative 30/30 provinces	National representative 30/30 provinces	National representative 31/31provinces	National representative 31/31provinces	National representative (not include Tibet) 30/31 provinces
Sampling method	One stage sampling (Community–Shengchandadui and juminweiyuanhui)	One stage sampling	Two stage sampling (county, village)	Three stage sampling (county, township, village)	Same sampling units as 1997 survey	Stratified three stage sampling (county, township, village)
Age of women interviewed	15-67	15-57	15-49	15-49	15-49	15-49
Total number of women interviewed	310,101	640,686	107,047	15,213	39,586	33,257
Weight	Self-weighting	Sampling fraction	Self-weighting	Self-weighting	Self-weighting	Self-weighting

Note: Hainan province established in 1988, Chongqing province established in 1997.

3.2 QUALITY OF DATA

The Population and Family Planning Surveys are a rich source of data to assess the levels of and trends in fertility in China. However, potential problems relating to the omission and misdating of events, which plague all retrospective fertility surveys, may appear to different degrees in each survey, thus confounding the interpretation of fertility trends. Thus a comparative evaluation of data quality will be presented in this session, which builds upon internal and external consistency checks for the age, marriage and birth history data from six surveys considered in this thesis.

3.2.1 DATA ON THE AGE DISTRIBUTION

Consistent and good age reporting is an essential prerequisite for accurately measuring age-specific fertility rates (United Nations 1987a). With respect to the assessment of age-reporting, internal checks for data quality include the estimation of Myer's index[1]computed from the individual data. The external check consisted of a comparison of the female age distribution from the survey data used for this analysis with the corresponding census or survey conducted by National Bureau of Statistics.

Table 3.2 shows that Myer's index range from 2.2 for 2006 survey to 4.1 for 1997 survey. For the age distribution, 1982, 1988, 1992 and 2001 surveys have very close distribution as the corresponding census or surveys. However, for the 1997 survey the younger age groups 15-19 and 20-24 seem overrepresented – 4.1 per cent and 6.3 per cent higher than the corresponding figures; and age group 30-34 is underrepresented – 6.9 per cent lower than the corresponding figure. For the 2006 survey the youngest age group 15-19 is underrepresented – 7.7 per cent lower than the corresponding figure.

[1] This methods yields an index of preference for each individual digit (0-9) representing the deviation from 10 percent of the proportion of the population reporting on the given digit. If there were no digit preference, then the index would be zero (Srinivasan 1998).

This might be significant for the estimation of recent total fertility rate, especially in a low fertility situation.

Table 3.2. Age Distribution and Myer's Index of the Surveys (per cent)

	1982		1988*		1992		1997		2001		2006	
15-19	19.8	(-0.1)	19.4	(2.6)	16.9	(1.2)	16.9	(4.1)	10.6	(-2.5)	7.4	(-7.7)
20-24	11.9	(0.1)	18.0	(0.3)	20.5	(1.0)	20.5	(6.3)	10.3	(-1.4)	9.3	(-2.5)
25-29	14.8	(0.3)	12.7	(-1.9)	19.4	(0.8)	19.4	(0.5)	14.7	(-0.9)	11.8	(0.2)
30-34	11.4	(0.1)	13.7	(2.1)	11.3	(-1.3)	11.3	(-6.9)	19.2	(1.1)	17.0	(2.5)
35-39	8.4	(0.1)	11.3	(-0.7)	13.4	(-0.8)	13.4	(2.0)	18.8	(1.4)	20.4	(2.8)
40-44	7.4	(0.1)	8.2	(-0.5)	10.8	(-0.5)	10.8	(-2.9)	12.5	(1.4)	20.4	(2.6)
45-49	7.4	(0.2)	7.0	(0.3)	7.7	(-0.4)	7.7	(-3.1)	13.9	(1.0)	13.6	(2.0)
50-54	6.5	(0.3)	6.6	(0.4)								
55-59	5.6	(0.3)	3.0	(-2.7)								
60-64	4.6	(0.2)										
65-69	2.2	(-1.4)										
Myer's index	3.2		3.2		3.0		4.1		3.2		2.2	

Note: values in the brackets are percentage difference between surveys used for this research and corresponding census or large scale surveys conducted by NBS. *the difference is between 1988 survey and 1990 census

3.2.2 DATA ON THE PERCENTAGES NEVER MARRIED

In the assessment of the marriage data, the external check consists of a comparison, for the five-year age groups, of the percentage never married as calculated from the surveys with similar percentages from either censuses or other surveys. Table 3.3 shows that 1982, 1988, 1992 surveys have percentages closer to corresponding censuses. However, 1997, 2001 and 2006 surveys age group 20-24, never married women is largely underrepresented in the survey sample, with difference of over 10 percent. The 2006 survey age group 25-29 is also underrepresented in the survey sample, with a difference of over 5 percent. This skewness may influence the age-specific estimation of total fertility rate. However, marriage is almost universal across China and most women remain married throughout their reproductive ages (Lee and Wang 1999; Lu and Zhai, 2009). The percentage of unmarried among female age 50 and above in 1964, 1982, 1990, 2000, 2005 was 0.42 per cent, 0.28 per cent, 0.09 per cent, 0.19 per cent and 0.18 per cent respectively. Thus the parity progression ratio based total fertility rate, which is less sensitive for the timing of marriage, may be less biased than age specific rate based

total fertility rate. To illustrate this we weight 2001 survey data using 2000 census age-specific unmarried rate and compare TFRasfr and TFRppr with and without weight. The results show that, after applying the weights, TFRasfr changes from 1.44 to 1.39; while TRFppr changes from 1.43 to 1.42.

Table 3.3. Percentage of Never Married by Age Group (per cent)

	1982		1988*		1992*		1997**		2001**		2006***	
15-19	95.6	(0.0)	94.8	(-0.5)	96.7	(1.4)	98.2	(-0.5)	98.4	(-0.3)	97.2	(-1.5)
20-24	47.2	(0.7)	41.3	(-0.1)	44.0	(2.7)	47.5	(-10.0)	46.6	(-10.9)	42.0	(-15.4)
25-29	5.7	(0.4)	6.1	(1.8)	4.4	(0.1)	5.2	(-3.5)	5.6	(-3.1)	7.3	(-5.4)
30-34	1.0	(0.3)	1.0	(0.4)	0.9	(0.3)	0.5	(-0.9)	0.9	(-0.5)	1.1	(-1.0)
35-39	0.3	(0.0)	0.5	(0.2)	0.3	(0.0)	0.3	(-0.2)	0.4	(-0.1)	0.3	(-0.4)
40-44	0.2	(0.0)	0.3	(0.1)	0.1	(-0.1)	0.4	(0.1)	0.2	(-0.1)	0.2	(-0.2)
45-49	0.2	(0.0)	0.3	(0.1)	0.1	(-0.1)	0.1	(-0.1)	0.1	(-0.1)	0.1	(-0.2)

Note: values in the brackets are percentage difference between surveys and corresponding census or surveys. *differences are between 1988, 1992 survey and 1990 census. **differences are between 1997, 2001 survey and 2000 census. *** differences are between 2006 survey and 2005 Population Survey conducted by National Bureau of Statistics (NBS).

3.2.3 BIRTH HISTORY DATA

Five of the six surveys recoded higher parity up to 20 births unlike other resources such as censuses or any other large scale surveys conducted by NBS. For example the 1982 survey recoded up to 20 live births; 1988 survey recoded a maximum of 24 pregnancies; 1997, 2001 and 2006 surveys recorded a maximum of 15, 12 and 8 pregnancies respectively. Exceptionally, the 1992 survey recoded only the last 4 live births.

The complete enumeration of births is necessary but not sufficient to assume accurate fertility estimates. When the period of time is an important dimension of the analysis, the accurate placement of births in the past is crucial to the correct measurement of trends as well as to the estimation of levels averaged over a period of years prior to the survey. When distant births are systematically displaced towards the survey date or recent births displaced back in time, or both, trends will be exaggerated. In addition, when the reporting of recent births is displaced back in time, recent levels will be

underestimated. This phenomenon is known as the Potter effect which can suggest fertility changes that are in fact unreliable (Potter 1977).

An evaluation of the birth history data included, as an internal check, an examination of age-specific fertility rates for single years before the survey and consistency of total fertility rate calculated from parity progression ratios. The external checks include a comparison of age-specific fertility rates from census or other surveys with the data for comparable calendar years in the past.

Total fertility rate (TFRppr and TFRasfr) from 1971 to 2005 calculated from different round of surveys almost overlapped for those years where data points were calculated from two or three surveys, except in year 1978 and 1979 where the values calculated from 1982 survey were slightly lower than those calculated from 1988 survey. TFRppr and TFRasfr reported by NBS which were calculated from 2000 census for the period 1990 to 2000 also closely matched those calculated from our surveys (Figure 3.1). The consistency of the outcome is a good indicator of the survey data quality.

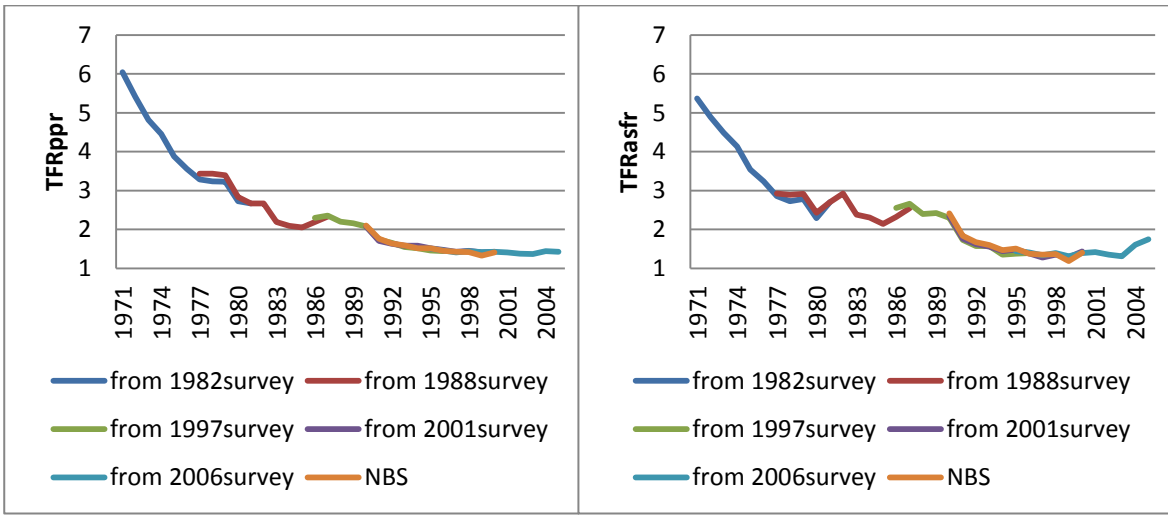


Figure 3.1. Comparison of TFRpprs and TFRasfr Calculated from Different Round of Surveys; NBS Source is from National Bureau of Statistics of China and East-West Center (2007).

As for the age-specific fertility rate, results from the survey are generally higher than that of the census, especially for age group 20-24 and 25-29 (Table 3.4 and Figure 3.2). This might link to the lower proportion of unmarried in these two groups in our survey discussed earlier. Another reason might be the under reporting of new born birth in 2000 census. Using Own-children method and Birth history reconstruction method, it was noted that the age-specific fertility rate derived from 2000 census was higher than that of calculation from direct birth report data (Retherford et al. 2005, NBS and East-West Centre 2007). If we weight 2001 survey data using the age-specific unmarried rate derived from 2000 census, we get much closer age-specific fertility rate with the Birth history reconstruction estimates (Figure 3.3).

Parity progression ratios are largely insensitive to tempo effects, and are also robust to misreported dates of birth. They can be very useful when trying to establish evidence for real fertility change as distinct from apparent fertility change produced by tempo effects on period measures.

Table 3.4. Comparison of Age-specific Fertility Rate (expressed per 1000 women) in Year 2000 from 2000 Census and 2001 Survey.

	2000Census	2001Survey	per cent difference	2000Census (Birth history reconstruction estimates)	2001Survey (weighted estimates)	per cent difference
15-19	5.96	7.86	24.2	6.4	7.75	17.4
20-24	114.49	144.58	20.8	126.3	134.82	6.3
25-29	86.19	97.08	11.2	101.2	96.79	-4.6
30-34	28.62	31.35	8.7	35.3	31.61	-11.7
35-39	6.22	4.97	-25.2	8.10	5.06	-60.2
40-44	1.46	1.71	14.6	2.0	1.55	-28.8
45-49	0.68	0.00	-	0.6	0.00	-
TFR	1.22	1.44	15.3	1.40	1.39	-0.7

Resource: 2000Census (Birth history reconstruction estimates) from NBS and East-West Centre 2007

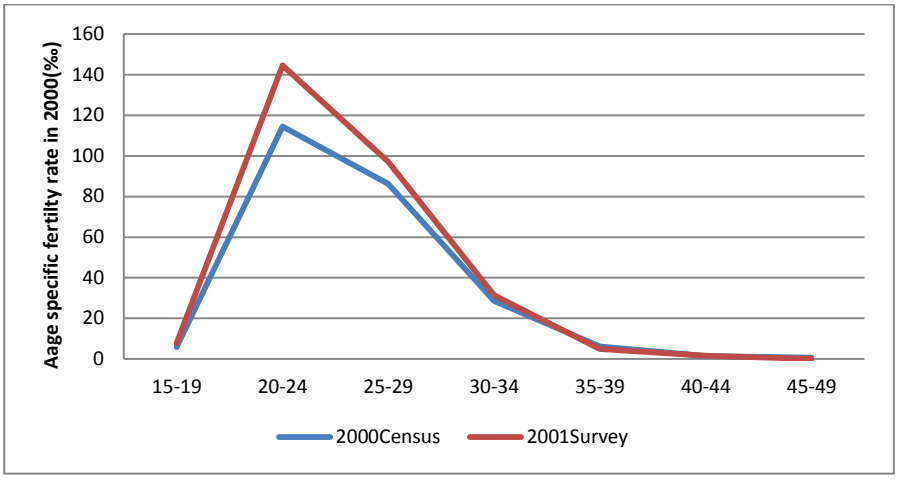


Figure 3.2. Age-specific Fertility Rate in Year 2000 from 2000 Census and 2001 Survey.

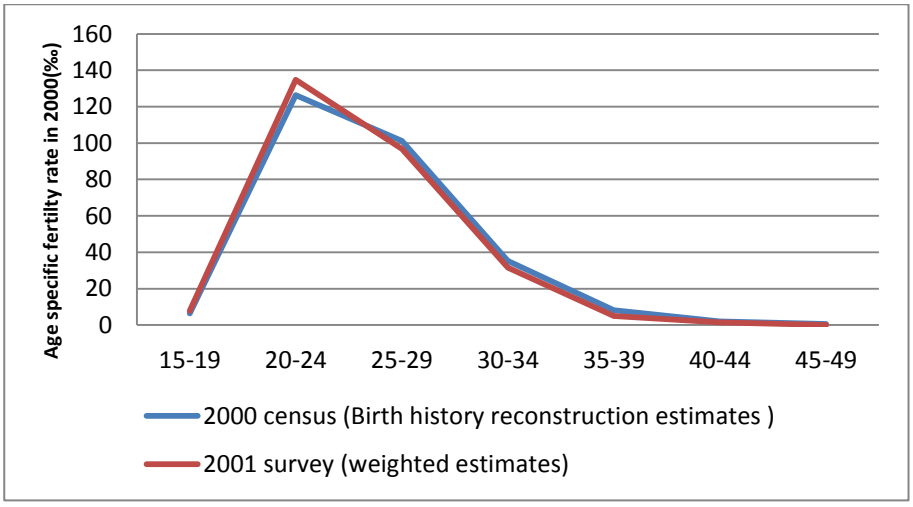


Figure 3.3. Age-specific Fertility Rate in Year 2000 from 2000 Census (Birth history reconstruction estimates) and 2001 Survey (weighted estimates).

3.3 STRENGTHS AND LIMITATIONS

Six surveys were conducted between 1982 and 2006. They are the only available data sets at the national level which collect information about full birth history of Chinese women. They provide the reasonable estimate of levels and trends.

Limitations of retrospective data include recall error and recall bias. Recall accuracy tends to be high for marital and fertility history; recall tends to be low for attitudes and values, unemployment or layoff, and subjective indicators (Dex 1995). There are some limitations using birth history data from cross sectional surveys to measure fertility (Bhrolcháin 1987). Fertility experience is censored or truncated at the time of interview. Secondly, the age range of the women covered by surveys becomes progressively younger as one move backwards in time from the interview. Another drawback of birth history data collected in cross-sectional surveys is that they are necessarily based only on women alive and present in a particular population at the time of the survey. Those who died or emigrated from the population may be not represented in the data. Similarly, the surveys account for fertility in previous historical periods may include the experience of people who migrated subsequently into the population and were present at the time of the survey. We also need to consider differences between surveys in the design when applying cross survey comparisons. The available information from each survey is listed in Table 3.5.

Table 3.5. Variables in Each Survey

	1982	1988	1992	1997	2001	2006
Variables						
Birth history (date of each live birth, sex of each)	yes	yes	Only last four live birth	yes	yes	yes
Current Contraceptive use	yes	yes +Contraceptive use history	yes	yes	yes	yes
Abortion	yes	yes	no	yes	yes	yes
Breast feeding month	no	yes	no	no	no	no
Post menstruation duration	no	yes	no	no	no	no
Birth year and month	yes	yes	yes	yes	yes	yes
Marital status	yes	yes	yes	yes	yes	yes
Ethnicity	yes	yes	yes	yes	yes	yes
Education	yes	yes	yes	yes	yes	yes
Occupation	yes	yes	no	no	no	no
Rural/urban residence	yes	yes	yes	yes	yes	yes
Rural/urban Hukou or Hukou province		yes	yes	no	no	yes
Residence province	yes	yes	yes	yes	yes	yes
Desired family size	no	no	No	yes	yes	yes
IEC materials reception/and content	no	no	No		yes	
Contraceptive informed choice variables	no	no	No	yes	yes	yes
Household (for screening the eligible individual)	no	yes	yes	yes	yes	yes
Household assets	no	no	no	no	no	yes
Old age security	no	no	no	no	no	yes
Community	no	no	yes	yes	no	no
Type of topography	no	no	no	yes	no	no
Distance to service/school	no	no	no	yes	no	no
Type of drinking water	no	no	no	yes	no	no
Electricity availability	no	no	no	yes	no	no
School availability	no	no	no	yes	no	no
Per capital income	no	no	no	yes	yes	yes
FPP/health service variables	no	no	no	no	yes	yes
FPP station survey (rural)	no	no	no	no	yes	no

3.4 METHODS

3.4.1 A REVIEW OF METHOD OF ASSESSING THE IMPACT OF FAMILY PLANNING POLICY ON FERTILITY

There are several possible ways that have been proposed to examine the impact of family planning programmes/policy on fertility (United Nations 1978; Ross and Lloyd 1992).

1. **Standardization approach**: This methodology involves two steps. Firstly any change in fertility at two points in time is measured. And then the observed change are analysed by standardizing for various non-programme/policy components. Standardization clarifies part of the observed change and the remaining can thus be ascribed to the family planning programme/policy. The potential drawback of this approach is that some of the non-programme/policy factors may not be easily measured and standardized, but they can affect observed fertility change.

2. **Trend analysis**: Based on the sensible assumptions, fertility trend assuming no family planning programme/policy may be estimated. This estimated trend in fertility is then compared with the real trend. The difference between the two trends can be attributed to the family planning programme/policy. Then again, rather than attribute to the programme/policy, a trend distinction can come about because of wrong projection assumptions.

3. **Experimental designs**: This is the gold standard approach for evaluating the impact of family planning programmes/policy on fertility. Here the study population is divided into two groups randomly – an experimental group and a control group. The first group is assigned to expose to the family planning programme/policy; while the second group, having the same features as the first group, does not expose to the family planning programme/policy. Then the fertility of each group is measured at one or several points in time. Given the two groups are comparable except for the programme/policy factor, any difference in fertility between two groups is attributed to the programme/policy. However, the classical experimental design is rarely implemented in real social settings because it may be unethical or impossible to randomly assign people to groups. In

practice, researchers seek for various forms of ex post facto matching procedures, for instance, propensity score matching, to achieve two comparable groups.

4. **Regression analysis**: This technique involves specifying a regression model where the dependent variable is a fertility indicator and the independent variables are programme/policy and non-programme/policy factors. Through the mathematic model, quantitative estimates of family planning programmes/policy in explaining differences in the dependent variable are calculated. This method consists of crucial steps of selecting the variables and procedure for estimating regression coefficients.

3.4.2 ANALYTICAL METHOD FOR PAPER 1

Paper 1 of this thesis has two inter-related questions: What are the effects of family planning policy on fertility transition process in China? How do socio-economic factors mediate the influence of family planning policy on fertility change over time and place? The analysis is based on survey data from the five National Population & Family Planning cross-sectional surveys conducted in 1982, 1988, 1997, 2001 and 2006 respectively. Socio-economic data are derived from the publication of National Bureau of Statistics of China.

Fertility trends and differentials by family planning policy are examined, followed by fertility decomposition during different FPP period. Given that FPP in China have clear target on parity and birth order, the contribution of each successive parity progression ratios on fertility change can be approximately considered as impacts of family planning policy.

In order to examine the contribution of marriage and each successive parity progression ratios on fertility change ΔTFR_{ppr}, we decompose ΔTFR_{ppr} following the procedures outlined by Ogawa and Retherford (1993). For any given time period year A to year B, to calculate the contribution of marriage progression ΔpM to $\Delta TFRppr$, firstly, a standardized value called TFRppr (M) was calculated using year B value of pM but the year A values of the remaining PPPRs (Period Parity Progression Ratios). The contribution of ΔpM to Δ TFRppr was TFRppr (M) – TFRppr (year A). To calculate the additional contribution of $\Delta p0$ to Δ TFRppr, again a standardized value of TFRppr (M,0)

was calculated using the year B value of pM and p0 and the year A values of the remaining PPPRs. The additional contribution of Δp0 to ΔTFRppr was TFRppr (M,0)-TFRppr(M). Following the same method, I calculate the contributions from Δp1, Δp2, Δp3, Δp4 and so on. The last contribution added to ΔTFRppr was calculated as the difference between TFRppr (year B) and TFRppr (year A).

The formula of decomposition is as follows. Subscript tA and tB indicate time A and time B.

$\Delta TFR_{ppr} = \Delta pM + \Delta p0 + \Delta p1 + \ldots + \Delta pj$

ΔTFR_{ppr} is defined as difference in TFR_{ppr} between two time periods.

ΔpM is defined as difference attributable to marriage progression between two time periods = $(pM_{tB}p0_{tA} + \ldots + pM_{tB}p0_{tA}p1_{tA}p2_{tA}p3_{tA}\ldots pj_{tA}) - (pM_{tA}p0_{tA} + \ldots + pM_{tA}p0_{tA}p_{tA}p2_{tA}p3_{tA}\ldots pj_{tA})$

Δp0 is defined as difference attributable to progression of marriage to first parity between two time periods= $(pM_{tB}p0_{tB} + \ldots + pM_{tB}p0_{tB}p1_{tA}p2_{tA}p3_{tA}\ldots pj_{tA}) - \Delta pM$

Δp1 is defined as difference attributable to progression of first parity to second parity between two time periods= $(pM_{tB}p0_{tB} + \ldots + pM_{tB}p0_{tB}p1_{tB}p2_{tA}p3_{tA}\ldots pj_{tA}) - \Delta p1$

Δpj is defined as difference attributable to progression of the second last parity to the last (j^{th}) parity between two time periods= $(pM_{tB}p0_{tB} + \ldots pM_{tB}p0_{tB}p1_{tB}p2_{tB}p3_{tB}\ldots pj_{tB}) - (pM_{tA}p0_{tA} + pM_{tA}p0_{tA}p1_{tA}p2_{tA}p3_{tA}\ldots pj_{tA})$

Survey data in 1982, 1988, 1997, 2001 and 2006 were analysed individually. Annual PPPRs and TFRppr were calculated up to 10 years prior to each survey (Appendix table 4.4a). For instance, fertility estimates in 1971-1981 were calculated from 1982 survey, estimates in 1977-1987 from 1988 survey and so on. Thus in some years we get two or three estimates: 1977-1981 from 1982 and 1988 surveys respectively; 1986-1987 from 1988 and 2001 surveys respectively; 1990-1994 from 1997 and 2001 survey respectively; 1995-1996 from 1997, 2001 and 2006 survey respectively; 1997-2000 from 2001 and 2006 survey respectively. Theoretically, we can accept any duplicated annual estimate for the analysis because each survey was designed national representatively. Figure 3.1 also shows the proximately overlapping of fertility

estimates for those years where data points were calculated from two or three surveys. In practice, for those duplicated annual estimates, we accept annual fertility estimates in 1977-1981 from 1982 survey, estimates in 1986-1987 from 1988 survey, estimates in 1990-1996 from 1997 survey, and estimates in 1997-2000 from 2001 survey.

3.4.3 ANALYTICAL METHOD FOR PAPER 2

Paper 2 addresses two questions: To what extent family planning policy affects women's fertility behaviour (particularly the transition to second and third births) over time? How did the policy influence fertility behaviour of different education groups across time? The analysis considered data from the China Population and Family Planning Surveys conducted in 1982, 1988, 1997, 2001 and 2006. A discrete time complementary log-log survival model is employed (Retherford et al. 2010). The outcome measures are the risks to 2nd or 3rd births conditional on previous parity (1 or 2). The main explanatory variable is various family planning policies. They are changing over time and have different dimensions, e.g. rural/urban Hukou and geographic dimension. The educational attainment of the respondents was measured using three categories: primary education and below, lower secondary education and upper secondary and above education. The analysis considered a set of demographic and socio-economic variables including: age at the previous parity, rural/urban residence, ethnicity, child sex composition, provincial level contraceptive prevalence and household income. The survey stratification variables, such as survey and province, were controlled in all statistical models.

Two separate discrete time complementary log-log survival models (CLL model) were specified with time measured from the previous birth, parity 1-2 and parity 2-3. The risk or hazard h(t) reflects the probability of an event's occurrence, conditional on survival and covariates, to some time t.

$$\text{cloglog}[h(t)]=\log(-\log[1-h(t)])= (\alpha_0+\alpha_1 T_1+ \alpha_2 T_2+\ldots \alpha_{10} T_{10})+(\beta_1 X_1+\beta_2 X_2+\ldots \beta_k X_k) \quad (1)$$

$$h(t) =1-\exp[-\exp(\alpha_0+ \alpha_1 T_1+\alpha_2 T_2+\ldots \alpha_{10} T_{10})+(\beta_1 X_1+\beta_2 X_2+\ldots \beta_k X_k)] \quad (2)$$

Equation (1) indicates that the cloglog transformed population hazard – cloglog[h(t)], is modelled as a linear combination of predictor values, in which T_1 to T_{10} are ten

duration dummy variables, reflecting birth intervals; X_1 to X_k are selected predictors; α_1 to α_{10} and β_1 to β_{10} are the coefficients and α_0 is the intercept. With the estimated parameters, the predicted model-based discrete time hazard or conditional probability functions can easily be calculated using equation (2).

The CLL model is estimated by maximum likelihood, yielding estimates of both coefficients and baseline hazard function (Box-Steffensmeier and Jones 2004, Singer and Willett 2003, Allison 1982). An anti-logged coefficient from the model with a clog-log link is a hazard ratio. The coefficients of predictor variables in the CLL model have the same interpretation as in the continuous-time Cox proportional hazards model. One-unit increase in a predictor variable multiplies the hazard by $\exp(\beta_i)$, where β_i is the coefficient of the predictor variable and $\exp(\beta_i)$ is called hazard ratio or relative risk. Baseline hazard function captures duration effects, fitted as a step function in our study with 10 time dummies because the birth interval was truncated at the 10th year. In the equation (1), $(\alpha_0+ \alpha_1T_1+ \alpha_2T_2+\ldots \alpha_{10}T_{10})$ model the shape of the baseline hazard function, which is the population hazard function when all predictors X_1 to X_k are set to 0.

Aadvantages of applying the CLL model to study parity progression was described in the paper by Retherford and his team (Retherford et al. 2010). First, the model can easily handle both left censoring and right-censoring, thereby enabling application of the model to period data. Second, when a complementary log-log (cloglog) link is used instead of a logit link, the parameter estimates from the model can be directly interpreted as ratios of continuous time hazard rates after anti-logging them. Third, in contrast to Cox regression, the CLL model provide an estimate of the shape of the baseline hazard function. Finally, the model can be estimated using widely available standard software packages.

A multivariate life table was constructed after the CLL model is fitted, from which the parity progression ratios was derived.

The CLL model first fit the pooled data from surveys in 1982, 1988, 1997, 2001 and 2006 to capture the impact of whole FPP evolution. And then the model fit period data

five years prior to each survey individually.

3.4.4 ANALYTICAL METHOD FOR PAPER 3

Paper 3 has two research questions: Are there noticeable effects of the informed choices policy on women's contraceptive behaviour in China? What are the factors that explain the shift towards informed method choices? Data are derived from the 2001 and 2006 National Population and Family Planning Surveys. The study sample consisted of married women of reproductive ages who are "new users of contraceptive methods" reported to be currently using a method with the starting point of usage no longer than 5 years prior to the survey. The analysis considers multivariate (multilevel) logistic regression. The dependent variable is a binary outcome defined as new users who made informed decisions on their own to use the current method and had knowledge about the side effects of their current method versus others. The main explanatory variables are the timing and family planning service provision variables at community level. Type of contraceptive use and relevant demographic and social characteristics of "new users" are controlled in the model.

Survey data in 2001 and 2006 were pooled for the analysis.

CHAPTER FOUR

EVOLUTION OF FAMILY PLANNING POLICIES AND FERTILITY IN CHINA 1971-2005

ABSTRACT

This study evaluates the effect of family planning policies (FPP) on the process of fertility transition during the pre- and post-transitional fertility periods in China and further examines the contribution of parity progression ratios to fertility change among different sub-populations exposed to various FPP over time and characterized by different socioeconomic and geographic criteria. We use cross-sectional birth history data from six consecutive rounds of nationally representative population and family planning surveys from early 1970s till mid-2000 covering all geographical regions of China. Four sub-populations exposed to differential FPP regimes are identified. The analyses demonstrate compelling evidence of the influential role of FPP in reducing higher parity progression ratios across different sub-populations. The findings suggest that the prevailing socioeconomic conditions facilitated the extent and speed of FPP response to reducing fertility levels across China.

4.1 INTRODUCTION

The scale and population impact of the Family Planning Policy (FPP) in China has been widely documented in the demographic and social science literature ever since it was introduced (Tien 1980, 1984; Bongaarts and Greenhalgh 1985; Greenhalgh 1986, 2003; Poston and Gu 1987; Hardee and Banister 1988; Liang and Lee 2006; Zeng 2007; NPFPC 2007; Zhai and Li 2014). Although typically referred to as the 'one child policy' elsewhere, in reality the FPP in China has been implemented in various phases differentially across various sub-populations based on socioeconomic, geographic and population criteria. There has been little demographic analysis that has systematically disentangled how the FPP, implemented over time and differentially across sub-populations, has contributed to sustained fertility transition in China. The analysis of sub-populations characterized by socioeconomic conditions is critically important to ascertain the net impact of FPP on fertility and reproductive behaviors, and in particular, to understand how structural changes reflected in terms of social and economic development have mediated the influence of FPP in triggering fertility change over time and space.

This study integrates cross-sectional birth history data from successive rounds of nationally representative population and family planning surveys, from the early 1970s till mid- 2000, to evaluate the underlying influences of FPP on the process of fertility transition in China, including the post-transitional period. The study further seeks to decompose the contribution of parity progression ratios to total fertility change among different sub-populations subject to differential FPP over time and characterized by different socioeconomic attributes. Two inter-related research questions are addressed in this study. First, how did FPP evolve across different sub-populations and over time in China? Second, how did the differential FPP, implemented across different sub-populations, contributed to overall fertility reduction in China? Our findings offer an understanding of how FPP contributed to triggering fertility transition among different sub-populations in China.

Three phases of FPP and fertility transition in China

In the early 1950s, the attitude of the Chinese government was actively in a pro-natalist mode, encouraging births. The results of the first census in 1953 stimulated the government to rethink about the population issue. During the late 1950s and 1960s, efforts were increasingly focused on disseminating the ideal of small family size and reinforcing contraceptive supplies, with such efforts being primarily concentrated in urban areas. Starting from 1970s onwards, a range of intensive family planning policies (FPP) have been formulated to reduce population growth. These policies have varied in their nature and the mode of implementation across time and contexts, and can broadly be divided into three key phases.

The first phase of 'Later, longer, fewer' FPP (1973–1979), also known as '*wan, xi, shao*' FPP, emphasized delayed marriage, long birth spacing and limits on the overall number of births. The age at first marriage was encouraged to be later than 23 years old for females and 25 years for males. Childbearing age was encouraged to be later than 24 years old for females. An interval of at least 3 years between births was recommended and the total number of children recommended per couple was no more than two. This was followed by the 'one child' FPP (1979–1984). In 1979, recognizing rapid population growth was putting considerable strain on the socioeconomic development and considering birth control to be a fundamental aspect of sustainable development, China began to promote 'one couple, one child' which became the most controversial FPP in the entire human history (Greenhalgh 2003). However, four years of strict implementation of the draconian policy caused considerable dissent, especially in rural areas, leading to the third phase of 'differentiated' FPP (1984 onwards).

In 1984, the Communist Party of China (CPC) Central Committee and the State Family Planning Commission issued Central Document 7, which allowed for a second child

among rural couples with 'practical difficulties', as long as the couples adhere to regulations outlined in the local plan. This document led to divergences in policy across provinces. Since the mid-1980s, the provinces (autonomous regions and municipalities) under the CPC Central Committee and the State Council's overall requirements, combined with the local situation, have developed local population and family planning regulations to make context-specific provisions.

The differentiated FPP can be broadly sub-divided into four types based on the number of children per couple permitted: 'one child', 'one and half children', 'two children' and 'three children' policies (Greenhalgh 2003; Gu et al. 2007; NPFPC 2007). The central features of each policy, along with the provinces covered and associated population coverage, are listed in Chapter II Table 2.1 and illustrated in Figure 2.3. In November 2013, the new leadership of the CPC announced a 'softening' of the strict family planning policy: families will be allowed two children if one parent is the only child. In October 2015, the government announced it would further relax the rules to allow all couples to have two children, signaling a new era in China's FPP.

Fertility in China was high in the 1950s and 1960s with a total fertility rate (TFR) of about 6 children per woman. From 1970 onwards, fertility declined rapidly to an average of about 2.7 children per woman in 1980 and fell below replacement level in 1990 with 2.0 children per woman (Peng and Guo 2000). There is a general consensus from the literature that although rapid socioeconomic development in many areas made important contributions to boosting fertility transition in China, this outcome is largely attributable to the 'Later, Longer, Fewer' FPP and the subsequent more strict family planning policies implemented by the Chinese government (Tien 1984; Bongaarts and Greenhalgh 1985; Wolf 1986; Feeney and Yu 1987; Poston and Gu 1987; Yang and Chen 2004; Retherford et al 2005; Chen et al 2009). However, there is also evidence to suggest that the onset of fertility transition and recent very low levels of fertility in China have both been driven by socioeconomic conditions. Birdsall and Jamison (1983) found that China's fertility decline was correlated with income growth, even before the

one-child policy was implemented. Similarly, Larvely and Freedman (1990) reported that urban fertility in China began to fall before the commencement of strict family planning program, attributed primarily to high contraceptive use among better educated and urban elites. More recently Cai (2010) demonstrated that the current below-replacement fertility in Jiangsu and Zhejiang province is primarily driven by rapid social and economic development. Thus the relative role of policy versus socio-economic development remains somewhat contested. This paper aims to further contribute to the debate by presenting new evidence concerning the impact of the FPP differentiated across time and space, decomposing the change in fertility across parities.

4.2 DATA AND METHODS

Data are drawn from 6 consecutive National Population and Family Planning cross-sectional surveys conducted in 1982, 1988, 1992, 1997, 2001 and 2006 respectively by the former State Family Planning Commission of China. The main purpose of the series of surveys was to document fertility, contraceptive use and other reproductive health issues of the population. Retrospective full birth history information is available in five surveys; with the exception being the 1992 survey where the birth histories of only last four children were recorded. All surveys were designed to be nationally representative, except for the exclusion of Tibet in 1982 and 2006 surveys. So for this study, Tibet is excluded from the analysis and the 1992 survey is not considered in the calculation of parity based fertility measures. A systematic assessment of the data in Chapter III indicated generally good quality and consistent records of marriage and birth history information. Further information about the surveys and data quality is reported in several academic studies (Coale 1984; Coale and Chen 1987; Feeney and Yu 1987; Feeney and Wang 1993; Feeney and Yuan 1994; Zhang and Zhao 2006; Morgan et al. 2009).

Data from 1982, 1992, 1997, 2001 and 2006 surveys were self-weighting. The dataset from the 1988 survey provided a weight based on the sampling fraction of each

province. Comparing the outcome of TFR_{ppr} (total fertility rates based on parity progression ratios) calculated from un-weighted and weighted data, the discrepancies of TFR_{ppr} in the years from 1977 to 1987 were all less than 4 per cent. Given that the influence of sample weights on the outcome was negligible, the remainder of this paper reports calculations based on un-weighted data.

Data on rural-urban residence and province are used to construct a typology to classify individuals in various subpopulations exposed to different family planning policies.

Sub-population I are urban residents nationwide, regulated by 'one child FPP' after 1984; **sub-population II** are rural residents in 6 provinces (Beijing, Tianjin, Shanghai, Jiangsu, Sichuan and Chongqing), regulated by 'one child FPP' after 1984; **sub-population III** are rural residents in 19 provinces (Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Guizhou, Shaanxi and Gansu), regulated by 'one and half children FPP' after 1984; and **sub-population IV** are rural residents in 5 provinces (Hainan, Yunnan, Qinghai, Ningxia and Xinjiang), regulated by 'two children FPP' after 1984.

This classification was motivated by the main types of differentiated FPP implemented from 1984 onwards listed in Table 2.1. Although subpopulation I and II are regulated with 'one child FPP', given the huge difference in the rural and urban context in China, it is worth to differentiate this two subgroups. It should be noted that even though, before 1984, the 'later, longer, fewer FPP' and 'one child FPP' were theoretically applied nationwide without differentiating subpopulations, the compliance with the policies and subsequent fertility behavior varied considerably among different population groups (Merli and Herber 2002). We therefore adopt the same sub-population classification through the whole study period 1971-2005 to examine the differential impact of FPP on fertility. In general, the socioeconomic condition of

subpopulations I, II, III, and IV can be ranked sequentially. Subpopulation I represent the group with best socioeconomic situation, with the lowest levels of illiteracy and the highest household income; and subpopulation IV represent the worst in terms of education and household income. Subpopulation IV had the highest representation of Non-Han ethnicity. Tables 4.1a-4.3a in the appendix show the distribution of Non-Han ethnicity, illiteracy and household income among different subpopulations from 1982-2006.

Methods

We use the full birth history data to calculate total fertility rates from parity progression ratios (TFR_{ppr}) based on the methods proposed by Feeney and Yu (1987), Bhrolcháin (1987) and Hinde (1998). To obtain the fertility rates up to the year of each survey, we apply a synthetic parity cohort approach. Although age-specific fertility rates (ASFRs) are widely used, period parity progression based measures of fertility are better suited for studying the impact of FPP on Chinese fertility. This is because FPP in China have always had clear focus on parity and birth spacing (Feeney and Yu 1987). For each survey, the parity progression ratio is estimated as the proportion of women who go on to have an additional birth within ten years. We assume that a woman who has not had a $(j+1)^{th}$ parity within ten years after her j^{th} parity is unlikely to do so. Parity progression ratios up to the ninth birth order for 1982 and 1988 surveys and up to the fourth birth order for 1997, 2001 and 2006 surveys were examined. The records were truncated at a woman's 49^{th} birthday at the time of survey. Women's marriage age was truncated at age 30. In the analysis, multiple births were recoded as second or later birth - given the low prevalence of multiple births[2].

[2] The largest sample survey in 1988 and the most recent survey in 2006 altogether yielded a total of 734, 000 births for women aged 15–49 from 1971 to 2005, of which 10.7 per 1000 were twins.

Using survey year and the retrospective birth history data, period parity progression based measures of fertility are then calculated for each sub-population, as well as for China as a whole. In addition, we investigate cohort fertility, which reflects the fertility behavior of a group of women who had experienced a specific event at a given time period in the past. We identify cohorts by birth year in five-year groups, each representing an aggregation of five annual birth cohorts. The fertility of these birth cohorts is measured by the mean number of children ever-born to members of the cohort. Each birth cohort had already reached their 40th birthday at the time of interview in each survey, except the 1965-1969 birth cohort (censored at 37th birthday for the youngest birth cohort). The mean number of children ever born can be considered as an approximation of the complete fertility of each five-year birth cohort.

In order to examine the contribution of marriage and each successive parity progression ratios on fertility change ΔTFRppr, we decompose ΔTFRppr following the principles outlined by Ogawa and Retherford (1993). For any given time period year A to year B, to calculate the contribution of marriage progression ΔpM to ΔTFR_{ppr} , firstly, a standardized value called TFR_{ppr} (M) was calculated using year B value of pM but the year A values of the remaining PPPRs (Period Parity Progression Ratios). The contribution of ΔpM to Δ TFR_{ppr} was TFR_{ppr} (M)- TFR_{ppr} (year A).

To calculate the additional contribution of Δp0 to Δ TFR_{ppr}, again a standardized value of TFR_{ppr} (M,0) was calculated using the year B value of pM and p0 and the year A values of the remaining PPPRs. The additional contribution of Δp0 to ΔTFR_{ppr} was TFR_{ppr} (M,0)- TFR_{ppr}(M). Following the same method, we calculate the contributions from Δp1, Δp2, Δp3, Δp4 and so on. The last contribution added to ΔTFR_{ppr} was calculated as the difference between TFR_{ppr} (year B) and TFR_{ppr} (year A).

Finally, in order to control for the fertility difference at the beginning of the period of 'differentiated FPP' implementation and the time effect as well, we calculate the impact

of FPP from 1984 to 2005 and from 1990 to 2005 (post-transition period) using the 'difference in difference' technique.

Survey data in 1982, 1988, 1997, 2001 and 2006 were analyzed individually. Annual PPPRs and TFRppr were calculated up to 10 years prior to each survey. For instance, fertility estimates in 1971-1981 were calculated from 1982 survey, estimates in 1977-1987 from 1988 survey and so on. Thus for some years we have more than one estimate: 1977-1981 from 1982 and 1988 surveys respectively; 1986-1987 from 1988 and 2001 surveys respectively; 1990-1994 from 1997 and 2001 survey respectively; 1995-1996 from 1997, 2001 and 2006 survey respectively; 1997-2000 from 2001 and 2006 survey respectively. Theoretically, we can accept any duplicated annual estimate for the analysis because each survey was designed to be nationally representative (Appendix Table 4.4a). In practice for those duplicated annual estimates we have used the annual fertility estimates for 1977-1981 from the 1982 survey, estimates in 1986-1987 from the 1988 survey, estimates in 1990-1996 from the 1997 survey, and estimates in 1997-2000 from the 2001 survey.

It should be noted that non-marital fertility is rare in China (Banister and Harbaugh 1994; Lu and Zhai 2009) and generally data on pre-marital births are either ignored or not published in official statistics. Marriage is universal and childbearing within marriage is a norm across China.

4.3 RESULTS

We first present fertility trends and differentials by FPP, followed by the results showing fertility decomposition during the different FPP regime periods, and finally we demonstrate the net impact of the differentiated FPP on TFRppr.

Fertility trends and differentials

Table 4.1 and Figure 4.1 show TFR_{ppr} and period progression ratios for China as a whole from 1971 to 2005. Fertility has declined dramatically from 6 children per woman in 1971 to 2 in 1990, and continued to drop to 1.4 in 2005. Progression to first marriage was virtually constant over the entire period between 0.98 and 1.00 indicating universal marriage in China from 1970s till 2005. Progression ratios from first marriage to first birth also remained high between 0.98 and 1.00 before 2000. After 2000, the progression ratios slightly declined to a low of 0.95 in 2003.

In the 1970s, major changes were observed at parities 2-6, whereas after 1979 significant changes began to emerge at parity 1. These trends are consistent with the implementation of the 'later, longer, fewer' policy in the 1970s and the introduction of the strict one-child policy in 1979. After 1984, when the strict one-child policy was gradually relaxed, the PPPRs at parity 1 stopped declining rapidly. Progression ratios from first to second birth were high and stable during 1970s, ranging between 0.96 and 0.98. Thereafter, the ratios dropped sharply to 0.87 in 1981 following the introduction of the one child FPP and continued to decline ever since – falling to below 0.80 by the end of 1980s, between 0.38 and 0.58 in 1990s and between 0.38 and 0.44 after 2000. Progression ratios to third and higher births declined significantly during the 1970s when the practice of 'later, longer, fewer' FPP was encouraged. From 1980 onwards, all higher parity progression ratios declined sharply, reflecting the effective implementation of one child FPP. Some patterns are shown in the orange boxes.

TFR_{ppr} reached a plateau from 1977 to 1979, just before the introduction of the one child FPP; TFR_{ppr} dropped from 3.29 to 3.23 within these three years. Period parity progression ratios also showed similar trends.

Table 4.1 Period Parity Progression Ratio-Based Total Fertility Rates (TFR_{ppr}) and Period Parity Progression Ratios: China 1971-2005

		Period parity progression ratios									
Year	**TFR_{ppr}**	**p_M**	**p_0**	**p_1**	**p_2**	**p_3**	**p_4**	**p_5**	**p_6**	**p_7**	**p_{8+}**
1971	6.04	0.982	0.980	0.983	0.949	0.887	0.857	0.853	0.810	0.807	0.830
1972	5.41	0.984	0.979	0.978	0.928	0.843	0.816	0.790	0.743	0.746	0.753
1973	4.82	0.974	0.977	0.977	0.916	0.812	0.743	0.701	0.683	0.668	0.667
1974	4.45	0.985	0.987	0.980	0.886	0.778	0.672	0.626	0.596	0.545	0.552
1975	3.88	0.985	0.986	0.968	0.834	0.696	0.589	0.528	0.501	0.485	0.476
1976	3.56	0.983	0.987	0.968	0.793	0.635	0.506	0.480	0.450	0.400	0.427
1977	3.29	0.987	0.985	0.960	0.742	0.564	0.470	0.411	0.385	0.363	0.310
1978	3.24	1.000	0.989	0.960	0.716	0.530	0.457	0.374	0.357	0.312	0.309
1979	3.23	0.995	0.992	0.963	0.704	0.544	0.435	0.423	0.335	0.332	0.275
1980	2.73	0.998	0.989	0.909	0.578	0.430	0.327	0.291	0.275	0.303	0.245
1981	2.67	0.998	0.992	0.866	0.564	0.440	0.376	0.376	0.305	0.364	0.284
1982	2.67	0.999	0.991	0.815	0.586	0.445	0.506	0.441	0.444	0.433	0.447
1983	2.19	0.997	0.987	0.674	0.490	0.386	0.470	0.382	0.340	0.345	0.405
1984	2.09	0.996	0.988	0.624	0.486	0.387	0.457	0.370	0.334	0.365	0.361
1985	2.05	0.997	0.982	0.644	0.446	0.335	0.435	0.363	0.330	0.322	0.367
1986	2.19	0.997	0.985	0.713	0.470	0.359	0.327	0.369	0.376	0.402	0.329
1987	2.33	0.997	0.989	0.748	0.502	0.401	0.376	0.385	0.392	0.423	0.435
1988	2.20	0.998	0.995	0.741	0.469	0.371					
1989	2.16	1.000	0.991	0.723	0.465	0.371					
1990	2.08	0.996	0.998	0.723	0.387	0.312					
1991	1.74	0.998	0.989	0.581	0.266	0.199					
1992	1.66	0.998	0.991	0.538	0.218	0.194					
1993	1.55	0.981	0.978	0.489	0.218	0.201					
1994	1.52	0.997	0.968	0.467	0.193	0.153					
1995	1.46	0.999	0.982	0.421	0.141	0.152					
1996	1.44	1.000	0.981	0.384	0.183	0.202					
1997	1.43	0.994	0.982	0.392	0.172	0.152					
1998	1.45	0.991	0.982	0.424	0.130	0.168					
1999	1.41	0.997	0.974	0.377	0.169	0.225					
2000	1.43	0.997	0.981	0.411	0.111	0.148					
2001	1.41	0.990	0.958	0.401	0.165	0.247					
2002	1.38	0.993	0.968	0.382	0.123	0.179					
2003	1.37	0.993	0.946	0.400	0.113	0.196					
2004	1.44	0.998	0.966	0.440	0.117	0.118					
2005	1.43	0.999	0.969	0.437	0.081	0.071					

Note: calculations based on data from 1982, 1988, 1997, 2001 and 2006 surveys

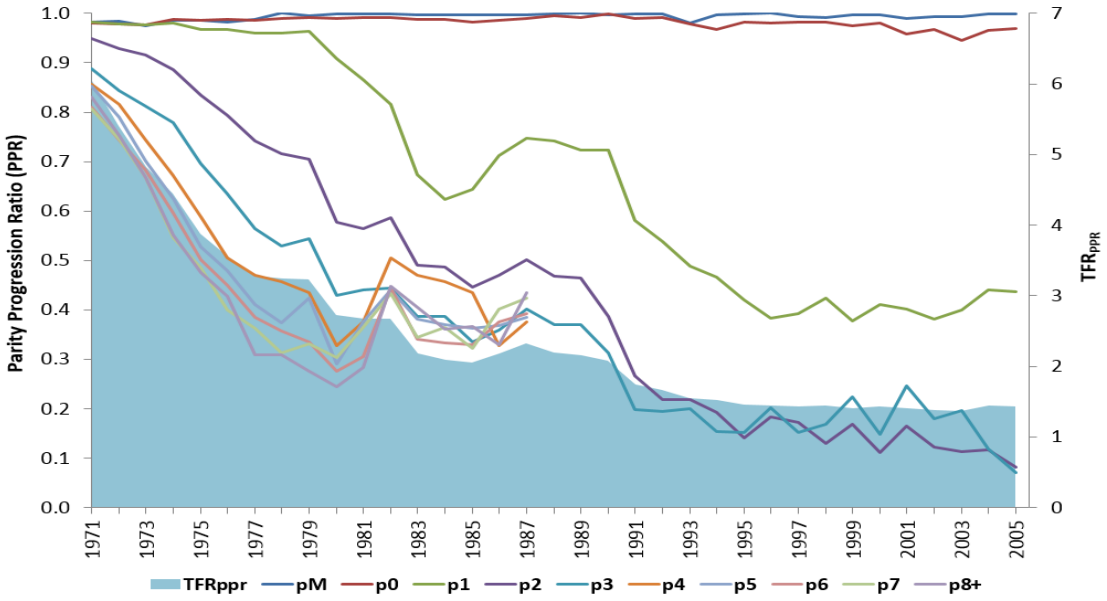


Figure 4.1 Period Progression Ratios and TFR_{ppr}: China, 1971-2005

The trend in cohort fertility shows that completed fertility started declining for the 1935-39 birth cohort and thereafter continued to drop for each successive birth cohorts (Table 4.2). Women born before 1940 on an average had more than 5 children by age 40; those born in 1940s had less than 4 children; those born in 1950s had less than 3 children and those born in 1960s had less than 2 children. This suggests that FPP implemented during the 1970s potentially influenced the completed fertility experience of all those birth cohorts of women born after 1935.

Table 4.2 Completed Fertility (mean number of children ever born by age 40) by Birth Cohort in China

Birth cohort	Mean	Number of women	Age in year 1973	Age in year 1979
1914-1919	5.3	13296	54-59	60-65
1920-1924	5.5	15891	49-53	55-59
1925-1929	5.6	18368	44-48	50-54
1930-1934	5.5	21833	39-43	45-49
1935-1939	5.0	22564	34-38	40-44
1940-1944	4.2	45069	29-33	35-39
1945-1949	3.3	9771	24-28	30-34
1950-1954	3.2	2022	19-23	25-29
1955-1959	2.1	5410	14-18	20-24
1960-1964	1.9	5778	9-13	15-19
1965-1969	1.7	6806	4-8	10-14

Note: calculations based on data from 1982, 1988, 1992, 1997, 2001 and 2006 surveys

Now we move from fertility trends for the whole country to examine trends in differential fertility amongst the subpopulations of women, regulated by different FPP. Figure 4.2 presents the TFR_{ppr} by subpopulations regulated by different FPP. The substantial fertility decline in China since 1970s is reflected in declines in the fertility of all subpopulations. Interestingly, however, there are marked differences in the initial level of fertility in 1975 across the different populations. The TFR_{ppr} of urban women regulated by 'one child FPP' was lower than that of those rural women who were regulated by 'one and half children FPP', which in turn was lower than those regulated by 'two children FPP' at all observed point in time. Over time, the gaps between the subpopulations regulated by different FPP have narrowed, and have remained constant in recent years.

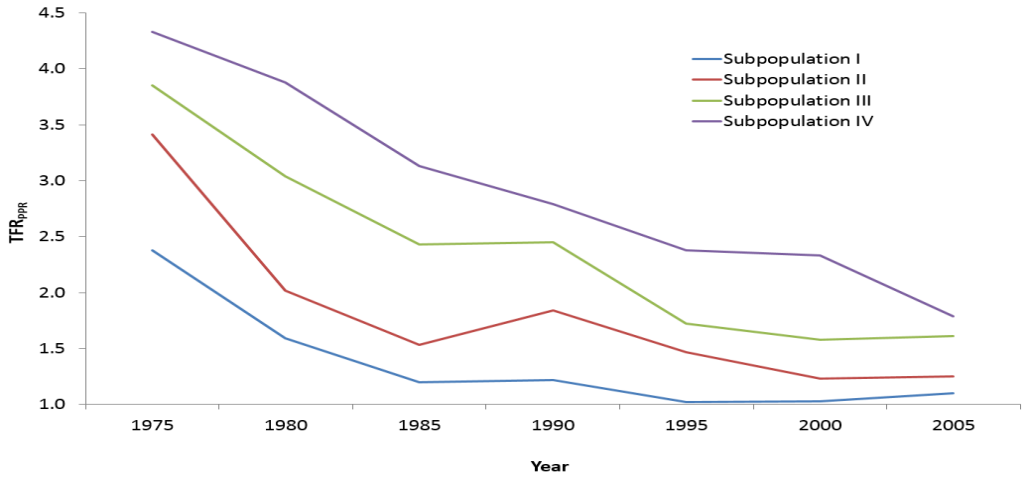


Figure 4.2 TFR_{ppr} among Different Sub-Populations

Note: calculations based on data from 1982,1988,1997,2001 and 2006 surveys

The PPPRs trends for each subpopulation are shown in Tables 4.3─4.6. All subpopulations share similar patterns in terms of progression from birth to first marriage and from first marriage to first birth, suggesting that both marriage and transition to first birth remain universal across China. We now focus on the rest of parity progressions, particularly those from parity 1-2 and from parity 2-3 in the different FPP periods.

Table 4.3 Period Parity Progression Ratios for Sub-Population I: China 1971-2005

		Period parity progression ratios					
Year	**TFRppr**	**pM**	**p0**	**p1**	**p2**	**p3**	**p4**
1971	3.17	0.976	0.972	0.966	0.784	0.551	0.492
1972	3.07	0.983	0.989	0.939	0.735	0.519	0.465
1973	2.92	0.982	0.984	0.935	0.699	0.499	0.325
1974	2.60	0.980	0.984	0.922	0.582	0.351	0.252
1975	2.38	0.979	0.984	0.875	0.492	0.308	0.248
1976	2.21	0.983	0.978	0.853	0.385	0.297	0.202
1977	2.10	0.958	0.968	0.852	0.391	0.213	0.162
1978	2.04	0.952	0.987	0.859	0.293	0.206	0.133
1979	1.98	0.982	0.980	0.807	0.261	0.168	0.142
1980	1.59	0.977	0.967	0.619	0.102	0.092	0.051
1981	1.34	0.994	0.987	0.344	0.062	0.073	0.004
1982	1.44	0.986	0.986	0.386	0.177	0.259	0.267
1983	1.22	0.982	0.982	0.221	0.165	0.221	0.271
1984	1.20	0.983	0.983	0.192	0.187	0.229	0.296
1985	1.20	0.973	0.973	0.215	0.198	0.211	0.270
1986	1.28	0.979	0.979	0.250	0.238	0.271	0.292
1987	1.29	0.980	0.980	0.261	0.240	0.235	0.293
1988	1.28	1.000	1.000	0.215	0.231	0.323	
1989	1.18	0.993	0.978	0.169	0.208	0.333	
1990	1.22	0.989	0.997	0.227	0.026	0.333	
1991	1.09	0.998	1.000	0.089	0.032	0.000	
1992	1.17	0.996	1.000	0.167	0.050	0.250	
1993	1.07	0.961	0.925	0.153	0.177	1.000	
1994	1.07	0.986	0.937	0.129	0.130	1.000	
1995	1.02	1.000	0.951	0.056	0.313	0.000	
1996	0.97	1.000	0.908	0.067	0.034	0.000	
1997	1.08	0.980	0.981	0.120	0.064	0.000	
1998	1.09	0.976	0.974	0.134	0.084	0.000	
1999	1.01	0.977	0.936	0.100	0.077	0.167	
2000	1.03	0.987	0.953	0.088	0.059	0.167	
2001	1.12	0.966	0.963	0.181	0.088	0.285	
2002	1.11	0.988	0.974	0.137	0.092	0.056	
2003	1.04	0.989	0.934	0.116	0.068	0.071	
2004	1.10	0.997	0.966	0.137	0.058	0.111	
2005	1.10	0.983	0.971	0.142	0.058	0.000	

Note: calculations based on data from 1982, 1988, 1997, 2001 and 2006 surveys

Table 4.4 Period Parity Progression Ratios for Sub-Population II: China 1971-2005

		Period parity progression ratios					
Year	**TFRppr**	**pM**	**p0**	**p1**	**p2**	**p3**	**p4**
1971	4.34	0.983	0.983	0.981	0.969	0.884	0.855
1972	4.00	0.972	0.980	0.986	0.939	0.796	0.741
1973	3.72	0.974	0.977	0.988	0.909	0.684	0.661
1974	3.64	0.980	0.994	0.982	0.869	0.662	0.592
1975	3.41	0.988	0.992	0.972	0.796	0.615	0.538
1976	3.13	0.997	0.984	0.974	0.730	0.510	0.401
1977	2.88	0.986	0.989	0.978	0.669	0.387	0.261
1978	2.59	0.997	0.995	0.936	0.547	0.282	0.149
1979	2.49	0.996	0.996	0.955	0.448	0.258	0.189
1980	2.02	0.997	0.989	0.780	0.302	0.131	0.133
1981	2.14	0.999	0.993	0.756	0.406	0.233	0.270
1982	1.96	0.993	0.993	0.751	0.239	0.255	0.352
1983	1.60	0.991	0.991	0.509	0.187	0.198	0.304
1984	1.45	0.990	0.990	0.390	0.183	0.219	0.196
1985	1.53	0.985	0.985	0.463	0.199	0.213	0.262
1986	1.89	0.992	0.992	0.663	0.316	0.187	0.265
1987	1.77	0.990	0.990	0.637	0.207	0.229	0.215
1988	1.76	0.976	1.000	0.635	0.241	0.100	
1989	2.05	1.000	0.995	0.725	0.377	0.224	
1990	1.84	1.000	1.000	0.606	0.314	0.222	
1991	1.52	0.986	0.954	0.496	0.237	0.050	
1992	1.47	0.977	1.000	0.441	0.129	0.071	
1993	1.40	0.980	0.968	0.396	0.189	0.091	
1994	1.38	1.000	0.987	0.357	0.128	0.000	
1995	1.47	1.000	1.000	0.444	0.069	0.000	
1996	1.27	1.000	0.969	0.283	0.098	0.053	
1997	1.23	0.979	1.000	0.233	0.074	0.083	
1998	1.24	1.000	0.974	0.262	0.043	0.000	
1999	1.25	1.000	0.967	0.263	0.106	0.056	
2000	1.23	0.994	0.983	0.236	0.082	0.125	
2001	1.10	0.978	0.966	0.108	0.508		
2002	1.14	1.000	0.959	0.153	0.217		
2003	1.16	0.977	0.985	0.161	0.244		
2004	1.24	1.000	1.000	0.192	0.231		
2005	1.25	1.000	0.986	0.210	0.289		

Note: calculations based on data from 1982, 1988, 1997, 2001 and 2006 surveys

Table 4.5 Period Parity Progression Ratios for Sub-Population III: China 1971-2005

		Period parity progression ratios					
Year	**TFRppr**	**pM**	**p0**	**p1**	**p2**	**p3**	**p4**
1971	4.54	0.986	0.983	0.989	0.979	0.940	0.902
1972	4.39	0.991	0.978	0.985	0.966	0.908	0.841
1973	4.20	0.975	0.978	0.983	0.960	0.888	0.759
1974	4.16	0.990	0.986	0.988	0.949	0.861	0.658
1975	3.85	0.994	0.986	0.982	0.908	0.766	0.540
1976	3.67	0.988	0.989	0.984	0.889	0.697	0.463
1977	3.50	0.991	0.984	0.976	0.851	0.638	0.468
1978	3.49	0.996	0.988	0.982	0.834	0.619	0.463
1979	3.53	0.998	0.992	0.988	0.841	0.620	0.444
1980	3.04	0.999	0.990	0.975	0.697	0.465	0.338
1981	2.97	1.000	0.988	0.957	0.671	0.460	0.364
1982	3.02	1.000	0.993	0.949	0.691	0.483	0.375
1983	2.60	0.999	0.989	0.877	0.565	0.396	0.312
1984	2.54	0.999	0.990	0.853	0.554	0.390	0.305
1985	2.43	0.999	0.986	0.871	0.482	0.324	0.280
1986	2.53	0.999	0.987	0.910	0.490	0.368	0.305
1987	2.67	0.999	0.993	0.941	0.525	0.396	0.331
1988	2.62	1.000	0.993	0.953	0.528	0.367	
1989	2.53	1.000	0.995	0.928	0.503	0.319	
1990	2.45	1.000	0.988	0.919	0.466	0.314	
1991	2.04	0.994	0.990	0.777	0.321	0.207	
1992	1.90	0.999	0.979	0.720	0.269	0.164	
1993	1.82	1.000	0.982	0.674	0.224	0.187	
1994	1.81	0.990	0.985	0.668	0.233	0.179	
1995	1.72	0.993	0.987	0.609	0.201	0.225	
1996	1.68	0.999	0.984	0.588	0.168	0.217	
1997	1.63	0.998	0.979	0.559	0.165	0.148	
1998	1.62	0.997	0.984	0.576	0.109	0.161	
1999	1.60	1.000	0.982	0.524	0.164	0.189	
2000	1.58	0.997	0.978	0.558	0.103	0.128	
2001	1.59	0.999	0.967	0.542	0.167	0.144	
2002	1.56	1.000	0.966	0.536	0.129	0.147	
2003	1.56	0.998	0.954	0.567	0.116	0.112	
2004	1.67	1.000	0.974	0.634	0.115	0.071	
2005	1.61	1.000	0.968	0.626	0.060	0.061	

Note: calculations based on data from 1982,1988,1997,2001 and 2006 surveys

Table 4.6 Period Parity Progression Ratios for Sub-Population IV: China 1971-2005

		Period parity progression ratios					
Year	**TFRppr**	**pM**	**p0**	**p1**	**p2**	**p3**	**p4**
1971	4.24	0.982	0.948	0.962	0.936	0.975	0.923
1972	4.31	0.984	0.972	0.966	0.936	0.960	0.879
1973	4.06	0.974	0.943	0.978	0.952	0.871	0.864
1974	4.42	0.985	0.980	0.990	0.961	0.925	0.855
1975	4.33	0.985	0.985	0.973	0.965	0.911	0.814
1976	4.26	0.983	0.975	0.984	0.973	0.884	0.778
1977	4.06	1.000	0.950	0.977	0.961	0.831	0.746
1978	4.18	0.997	0.974	0.978	0.942	0.879	0.732
1979	4.20	0.996	0.974	0.984	0.957	0.863	0.733
1980	3.88	0.999	0.978	0.983	0.886	0.783	0.639
1981	3.92	0.997	0.979	0.986	0.913	0.758	0.663
1982	3.96	0.998	0.986	0.982	0.893	0.785	0.686
1983	3.56	0.997	0.981	0.974	0.827	0.682	0.570
1984	3.44	0.995	0.986	0.963	0.789	0.665	0.550
1985	3.13	0.998	0.977	0.940	0.737	0.562	0.490
1986	2.91	0.910	1.000	0.952	0.920	0.424	
1987	3.31	0.997	1.000	1.000	0.802	0.647	
1988	2.26	1.000	0.864	0.838	0.602	0.551	
1989	2.85	0.811	0.966	0.949	1.000	0.778	
1990	2.79	0.988	0.947	0.967	0.678	0.550	
1991	2.27	0.966	0.878	0.967	0.542	0.363	
1992	2.41	1.000	0.962	0.959	0.370	0.534	
1993	2.40	0.986	1.000	0.906	0.470	0.251	
1994	2.43	0.990	0.981	0.883	0.514	0.373	
1995	2.38	1.000	0.961	0.961	0.429	0.262	
1996	2.35	1.000	0.968	1.000	0.408	0.054	
1997	2.31	0.997	1.000	0.847	0.469	0.193	
1998	2.07	0.999	0.883	0.903	0.394	0.262	
1999	2.11	1.000	0.988	0.705	0.487	0.248	
2000	2.33	0.996	0.988	0.819	0.585	0.143	
2001	1.76	0.999	0.912	0.664	0.333	0.234	
2002	1.85	1.000	0.953	0.788	0.189	0.037	
2003	1.96	0.998	0.975	0.831	0.195	0.136	
2004	1.77	1.000	0.953	0.677	0.249	0.100	
2005	1.79	1.000	0.962	0.656	0.296	0.045	

Note: calculations based on data from 1982,1988,1997,2001 and 2006 surveys

1971-1979 (later, longer, fewer FPP): During the period of the 'later, long fewer' policy the progression from parity 1-2 among subpopulation I who lived in urban areas of the whole country dropped from 0.97 to 0.81; among subpopulation II, the figure slightly declined from 0.98 to 0.96; among subpopulation III and subpopulation IV, the progression rate remained high around 0.98. The results indicate that during this period

a small share of urban residents started to control their fertility to less than two children, even though the FPP did not restrict the family size less than two children.

For progression from parity 2-3, the ratios declined sharply from 0.78 to 0.26 and 0.97 to 0.45 among subpopulation I and subpopulation II respectively. Among subpopulation III, the ratio decreased from 0.98 to 0.84, while among subpopulation IV, the ratio remained high around 0.96 during this period. The results indicate that 'later, longer, fewer' FPP was effective and widely accepted, or enforced, among subpopulations I and II. However, this FPP was not well adopted by the other two subpopulations. During the 1970s among subpopulation IV, 96 per cent of women who had second birth went on to have a third birth. Although there was some reduction among subpopulation III, still 84 per cent of women who had a second birth have had their third birth by 1979.

For higher parity progression, only 17 per cent of women who already had a third birth had the fourth birth by 1979, and only 14 per cent of women who already had their fourth birth had their fifth birth among subpopulation I. The corresponding ratios were 26 per cent and 19 per cent among subpopulation II, 62 per cent and 44 per cent among subpopulation III, and 86 per cent and 73 per cent among subpopulation IV. Again, these results reflect a wider adoption of FPP among subpopulations I and II accompanied by overall better socioeconomic conditions than subpopulation III and IV.

1979-1984 (one child FPP) Among subpopulation I, the progression from parity 1-2 declined sharply, from 0.81 in 1979 to 0.19 in 1984, meaning that the strict one child FPP was implemented very effectively among subpopulation I. Among subpopulation II, III and IV, the ratios declined from 0.96 to 0.39, 0.99 to 0.85 and 0.98 to 0.96 respectively, highlighting that although the policy had an effect, it was not universally adopted /accepted. Even in subpopulation II (rural residents of the 6 'developed' provinces of Beijing, Tianjin, Shanghai, Jiangsu, Sichuan and Chongqing) 39 per cent, of women who already had a first birth did not follow the one child FPP and amongst

rural residents in the other parts of the country this figure rose to 85 per cent (subpopulation III) and 96 per cent (sub population IV). This provides clear and compelling evidence of the level of non-compliance with the one child policy which subsequently led to the differentiated family planning policy that continued until 2013.

1986-2005 (differentiated FPP): During this period the progression from parity 1-2 declined significantly, from 0.25 to 0.14 and from 0.66 to 0.21 respectively among subpopulations I and II, both of which were subject to the 'one child only' FPP during this period. The progression ratio from parity 1-2 and parity 2-3 among subpopulation III, who were subject to the 'one and half children FPP', decreased from 0.91 to 0.63 and 0.49 to 0.01 respectively, reflecting that the policy was effective in reducing third births to virtually zero, and second births were curtailed. Among subpopulation IV, who were subject to 'two children FPP', the progression from parity 1-2 and parity 2-3 reduced from 0.95 to 0.66 and 0.92 to 0.30 respectively, again highlighting the effectiveness of the policy in reducing third births. Actual fertility amongst each sub-population was slightly higher than that implied by the differentiated FPP targets, reflecting the fact that there were some exceptions for each type of FPP and/or noncompliance with the policy. Nevertheless the results indicate that during this period of time, all four types of FPP were being widely implemented and effective.

Decomposition of fertility change

Table 4.7 shows the results of TFR_{ppr} decompositions overall and by different FPP periods. Since the trend of TFR_{ppr} has reached a plateau from 1977 to 1979, I divided the decomposition of 'later, longer, fewer FPP' periods into 1971 to 1977 and 1977 to 1979. Year 1979 is the end year of 'Later, longer, fewer FPP' and the start year of 'one child FPP', it is included in both periods (1977-1979 and 1979-1984). Although year 1984 is the end year of 'Nationwide one child FPP' and the start year of 'Differentiated

FPP', corresponding provincial level regulations were in place after 1984. Therefore, the last fertility decline period is from 1986-2005.

Over the entire period from 1971 to 2005, the TFR_{ppr} declined by 4.6 children per woman, with a reduction in the progression to parity two and to parity three accounting for 98 per cent of the overall decline.

1971-1977 (early stage of later, longer, fewer FPP): During the first six years of the 'later, longer, fewer' policy the TFR_{ppr} declined by 2.7 children per woman, from 6.04 to 3.29. The decline was largely attributable to a decrease in higher parity progression ratios, with approximately 94 per cent of the change being due to reduction in parity progressions at three, four, five and six. The results reflect that the 'later, longer, fewer' FPP was being effectively implemented among the general population as a whole during this period.

1977-1979 (later stage of later, longer, fewer FPP): In the latter years of the policy, however, the TFR_{ppr} remained almost constant. The drop of 0.1 in the TFR_{ppr} mainly resulted from a decline in progression to parity three, four and five. However it appears that the policy had run its course and further reductions in total fertility were proving difficult to achieve, stimulating a change in course and the introduction of a more stringent policy.

1979-1984 (one child FPP): During the period of strict enforcement of the one child policy, the TFR_{ppr} dropped from 3.2 to 2.1. The decompositions of fertility change showed that a reduction of progression from parity 1-2 contributed significantly to the overall national fertility decline, accounting for 69 per cent. In addition, reduction of progression from parity 2-3 contributed 23 per cent. The results are broadly consistent with the expected impact of FPP during this period of time. The period 1984-1986 was

not considered in the decomposition analysis since the majority of provincial regulations were still under process of formulation during this period.

1986-2005 (differentiated FP policies): During this period, when different policies were applied in different parts of the country, the national TFR_{ppr} continued to decline from 2.2 to 1.4 children per woman. The decomposition analysis illustrates that 74 per cent of fertility decline during this period was attributed to a reduction of progression from parity 1-2 and 33 per cent attributed to a reduction from parity 2-3.

Overall the results provide clear evidence of the influence of family planning policy on fertility decline in China. The later, longer, fewer FPP was effective in reducing higher parity births and the attainment of fertility plateau at the late stage of this policy possibly led to the initiation of one child FPP.

Net impact of differentiated FPP on TFRppr

Table 4.8 illustrates the approximate net impact of the differentiated FPP on TFRppr from 1984-2005 for each of the subpopulations. Over the two decades the TFRppr declined by 0.1, 0.2, 0.93 and 1.65 respectively from subpopulation I to IV. Given that the same policy was in place throughout the period, it could be argued that the reduction might due to socio-economic development or other structural factors rather than the FPP itself. After controlling for those influences, I calculate the impact of the one child FPP in rural areas (subpopulation II) on TFRppr change is 0.1 (0.2-0.1); the impact of one and half children FPP (subpopulation III) on TFRppr change is 0.83 (0.93-0.1) and the impact of two children FPP (subpopulation IV) on TFRppr change is 1.55 (1.65-0.1), with one child FPP in urban as the control group. If we consider the post-transition period from 1990-2005, the approximate net impact of the one child FPP in rural areas, the one and half children FPP and the two children FPP on the fertility reduction was 0.47, 0.72 and 0.88 respectively, with one child FPP in urban as the control group. This

method is based on the assumption that the social and economic trajectory of the four sub-populations has not changed during the period of observation.

Table 4.7 Change in the Period Parity Progression Ratio-Based Total Fertility Rate (TFRppr) and Shares of That Change Attributable to Changes in Period Parity Progression Ratios: China, 1971-2005

			Percentage contribution to change in TFR_{ppr} from change in										
Period	**Starting TFR_{ppr}**	**Ending TFR_{ppr}**	**pM**	**P0**	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**Total**
1971-1977	6.04	3.29	-1.1	-1.0	4.3	32.2	32.9	19.6	9.4	2.7	0.8	0.2	100.0
1977-1979	3.29	3.23	-42.8	-38.5	-9.1	115.2	37.2	33.0	-4.7	7.8	1.4	0.4	100.0
1979-1984	3.23	2.09	-0.5	1.2	69.4	22.8	7.1	-0.4	0.4				100.0
1986-2005	2.19	1.43	-15.4	7.0	74.3	32.9	1.8						100.0
1971-2005	6.04	1.43	-2.3	1.6	61.5	36.6	2.5	0.2					100.0

Table 4.8 TFRppr by Differentiated FPP from 1984-2005 and the Changes over Time

Year	One child FPP in urban	One child FPP in rural	One and half children FPP	Two children FPP
1984	1.20	1.45	2.54	3.44
1985	1.20	1.53	2.43	3.13
1986	1.28	1.89	2.53	2.91
1987	1.29	1.77	2.67	3.31
1988	1.28	1.76	2.62	2.26
1989	1.18	2.05	2.53	2.85
1990	1.22	1.84	2.45	2.79
1991	1.09	1.52	2.04	2.27
1992	1.17	1.47	1.90	2.41
1993	1.07	1.40	1.82	2.40
1994	1.07	1.38	1.81	2.43
1995	1.02	1.47	1.72	2.38
1996	0.97	1.27	1.68	2.35
1997	1.08	1.23	1.63	2.31
1998	1.09	1.24	1.62	2.07
1999	1.01	1.25	1.60	2.11
2000	1.03	1.23	1.58	2.33
2001	1.12	1.10	1.59	1.76
2002	1.11	1.14	1.56	1.85
2003	1.04	1.16	1.56	1.96
2004	1.10	1.24	1.67	1.77
2005	1.10	1.25	1.61	1.79
Change from 1984 to 2005	0.10	0.20	0.93	1.65
FPP impact (Difference in difference)		0.10	0.83	1.55
Change from 1990 to 2005	0.12	0.59	0.84	1.00
FPP impact (Difference in difference)		0.47	0.72	0.88

[1]One child FPP in urban as the reference (control group); [2]One child FPP in urban as the reference (control group)

4.4 Discussion

This analysis reconfirms that fertility in China has been declining dramatically since the 1970s, reaching replacement level in early 1990s and decreasing continually afterwards to well below replacement in the most recent two decades. The findings based on the analysis of retrospective birth histories are broadly consistent with evidence reported

elsewhere, for example, Feeney and Yu (1987), Feeney and Wang (1993), Freedman and Wang (1993), Zeng (1996) and Retherford et al (2005).

The declines in parity progressions over time provide compelling evidence of FPP as the potential trigger of fertility decline across China. The fertility differentials explained by the policy remain convincing in the transitional and post-transitional stage. Results from difference in difference analysis also offers support to the argument that FPP have continued to determine the level of Chinese fertility, even in the post-transitional stage, providing an alternative view to that of Cai (2010) and others. However, the disaggregation of fertility change amongst different subpopulations indicates that social economic conditions have played an important role for policy implementation. Women living in the regions regulated by the 'one and half children FPP' tend to have higher fertility than those regulated by the 'one child FPP'; and those regulated by 'two children FPP' tend to have higher fertility than those regulated by 'one and half children FPP'. The implication of this finding is that FPP remains a key determinant of China's overall level of fertility. Tsui (2001) and McNicoll (1975, 2001) affirms a potential direct effect of policy on fertility transition through improving access to fertility-regulation methods and through diffusion of supportive ideas. The Chinese government was indeed proactive in mobilizing resources and program coordination aimed at reducing fertility through a variety of strategic top-down administrative approaches, such as stringent legislation, wider dissemination of family planning information, provision of incentive-oriented and extended contraceptive services and political control . Over time, the role and influence of national FPP interventions and programs have been differentially implemented across subpopulations, with the national policies (such as later, longer few and the original one child policy) being more readily adopted by those who were relatively better off than their counterparts. By the time the differentiated policy was introduced in 1986, fertility in urban areas was already below replacement level. The results seem to suggest that socioeconomic conditions expedited the extent and speed of FPP response across China.

More recently, there has been a series of public debates about the implications of FPP on future population challenges in China particularly on issues related to labor shortages, population ageing and skewed sex ratios. There is evidence that the Chinese government is now taking steps to reform the FPP. The most recent FPP reform by all means is a cautious step, relaxing the policy to two children rather than removing the policy altogether, reflecting concerns that the relaxation might trigger a baby boom. On the other hand, findings from recent fertility intention surveys point towards a TFR far below replacement level in the foreseeable future (Zhuang et al. 2014; Zheng et al.2009). Mao and Lu (2013) argue that physiological factors and practical pressures will take precedence over fertility intention and preferences in reducing the actual fertility rate even lower than predicted. Alongside, with the increasing women's education and participation in economic activities, it is likely that the fertility increase might not be as large as is often assumed.

This study has systematically assessed the evolution of family planning policy in China and its impact on fertility change. The research confirms the dominant impact of policy throughout the fertility transition process, including the persistent role of policy in the post-transitional stage at a very low fertility level. There is also evidence that socioeconomic factors have mediated the influence of FPP on fertility change over time and place, with high compliance in the most urban, industrialized areas and weaker acceptance among women living in the poorest rural areas.

The gold standard approach for policy impact evaluation is to apply experimental design. However, this is not possible in this case since we cannot randomly assign people to groups i.e. with and without policy interventions. However by examining the differential impact of policy across sub groups of the population the paper adds new insights to strengthening the evidence base on Chinese fertility. Follow-up research is needed to monitor reproductive preferences and future trends in fertility especially in urban areas and among different socioeconomic groups.

Appendix

Table 4.1a Percentage of Non-Han Ethnic Women Aged 15-49 by Sub-Population, 1982-2006.

Sub-population	1982	1988	1992	1997	2001	2006
I	2.3	6.9	1.9	5.4	6.7	8.1
II	2.5	2.6	4.7	2.6	1.5	1.3
III	5.9	8.2	5.6	8.4	8.2	9.5
IV	47.7	43.7	42.7	57.0	59.9	52.5
Overall (China)	6.7	10.5	6.5	9.1	9.4	10.9

Note: calculations based on data from 1982, 1988, 1992, 1997, 2001 and 2006 surveys

Table 4.2a Percentage of Women Aged 15-49 by Level of Education and Sub-Population, 1982-2006

	1982			1988			1992			1997			2001			2006		
Sub-population	**None**	**Primary**	**More than primary**	**None**	**Primary**	**More than primary**	**None**	**Primary**	**More than primary**	**None**	**Primary**	**More than primary**	**None**	**Primary**	**More than primary**	**None**	**Primary**	**More than primary**
I	7.3	20.5	72.2	7.9	17.6	74.5	3.7	12.1	84.2	9.6	35.8	54.6	3.1	9.3	87.6	1.6	9.2	89.2
II	41.2	32.6	26.2	36.0	32.4	31.6	22.6	39.8	37.6	36.5	32.1	31.4	19.7	36.4	43.9	6.3	30.3	63.4
III	43.2	32.5	24.3	43.2	32.8	24.0	25.6	39.3	35.1	35.6	32.1	32.3	20.6	34.3	45.1	11.1	34.8	54.1
IV	53.2	30.4	16.4	56.2	26.2	17.6	35.5	39.2	25.3	41.0	15.2	43.8	32.9	42.7	24.4	15.6	41.0	43.4
Overall (China)	37.3	30.4	32.3	35.1	28.5	36.4	21.2	33.8	45.0	29.9	32.2	37.9	16.6	28.6	54.8	7.7	26.0	66.3

Note: calculations based on data from 1982, 1988, 1992, 1997, 2001 and 2006 surveys

Table 4.3a Mean Annual Per Capita Household Income (*Renminbi*, Yuan) by Sub-Population, 1982-2006

Sub-population	1982	1988	1992	1997	2001	2006
I	494	1187	2026	5151	6860	11442
II	349	837	1277	3273	4039	6400
III	267	521	750	2034	2272	3426
IV	240	501	694	1512	1793	2672
Urban China	535	1180	2027	5160	6860	11760
Rural China	270	545	784	2090	2366	3587

Estimated from National Bureau of Statistics (2010)

Table 4.4a. Period Parity Progression Ratio-Based Total Fertility Rates (TFRppr) and Period Parity Progression Ratios Calculated from 1982, 1988, 1997, 2001 and 2006 Survey.

	pm	p0	p1	p2	p3	p4	p5	p6	p7	p8	TFR(ppr)
1982 survey											
1971	0.982	0.980	0.983	0.949	0.887	0.857	0.853	0.810	0.807	0.830	6.04
1972	0.984	0.979	0.978	0.928	0.843	0.816	0.790	0.743	0.746	0.753	5.41
1973	0.974	0.977	0.977	0.916	0.812	0.743	0.701	0.683	0.668	0.667	4.82
1974	0.985	0.987	0.980	0.886	0.778	0.672	0.626	0.596	0.545	0.552	4.45
1975	0.985	0.986	0.968	0.834	0.696	0.589	0.528	0.501	0.485	0.476	3.88
1976	0.983	0.987	0.968	0.793	0.635	0.506	0.480	0.450	0.400	0.427	3.56
1977	0.987	0.985	0.960	0.742	0.564	0.470	0.411	0.385	0.363	0.310	3.29
1978	1.000	0.989	0.960	0.716	0.530	0.457	0.374	0.357	0.312	0.309	3.24
1979	0.995	0.992	0.963	0.704	0.544	0.435	0.423	0.335	0.332	0.275	3.23
1980	0.998	0.989	0.909	0.578	0.430	0.327	0.291	0.275	0.303	0.245	2.73
1981	0.998	0.992	0.866	0.564	0.440	0.376	0.376	0.305	0.364	0.284	2.67
1988 survey											
1977	0.986	0.983	0.955	0.751	0.485	0.857	0.442	0.432	0.460	0.512	3.43
1978	0.990	0.987	0.963	0.728	0.487	0.816	0.461	0.439	0.509	0.448	3.43
1979	0.995	0.990	0.961	0.731	0.474	0.743	0.461	0.454	0.465	0.443	3.39
1980	0.998	0.988	0.916	0.580	0.388	0.672	0.356	0.380	0.325	0.421	2.83
1981	0.999	0.987	0.844	0.563	0.419	0.589	0.404	0.413	0.398	0.427	2.67
1982	0.999	0.991	0.815	0.586	0.445	0.506	0.441	0.444	0.433	0.447	2.67
1983	0.997	0.987	0.674	0.490	0.386	0.470	0.382	0.340	0.345	0.405	2.19
1984	0.996	0.988	0.624	0.486	0.387	0.457	0.370	0.334	0.365	0.361	2.09
1985	0.997	0.982	0.644	0.446	0.335	0.435	0.363	0.330	0.322	0.367	2.05
1986	0.997	0.985	0.713	0.470	0.359	0.327	0.369	0.376	0.402	0.329	2.19
1987	0.997	0.989	0.748	0.502	0.401	0.376	0.385	0.392	0.423	0.435	2.33
1997 survey											
1986	0.997	0.991	0.778	0.482	0.475						2.30
1987	0.999	0.996	0.806	0.519	0.347						2.36
1988	0.998	0.995	0.741	0.469	0.371						2.20
1989	1.000	0.991	0.723	0.465	0.371						2.16
1990	0.996	0.998	0.723	0.387	0.312						2.08
1991	0.998	0.989	0.581	0.266	0.199						1.74
1992	0.998	0.991	0.538	0.218	0.194						1.66
1993	0.981	0.978	0.489	0.218	0.201						1.55
1994	0.997	0.968	0.467	0.193	0.153						1.52
1995	0.999	0.982	0.421	0.141	0.152						1.46
1996	1.000	0.981	0.384	0.183	0.202						1.44
2001 survey											
1990	0.998	0.991	0.703	0.431	0.331						2.08
1991	0.988	0.978	0.566	0.301	0.216						1.71
1992	0.999	0.984	0.511	0.243	0.207						1.63
1993	0.995	0.987	0.485	0.220	0.195						1.58
1994	0.996	0.985	0.472	0.240	0.202						1.58
1995	0.994	0.984	0.446	0.196	0.246						1.52
1996	0.997	0.984	0.415	0.173	0.228						1.48
1997	0.994	0.982	0.392	0.172	0.152						1.43
1998	0.991	0.982	0.424	0.130	0.168						1.45
1999	0.997	0.974	0.377	0.169	0.225						1.41
2000	0.997	0.981	0.411	0.111	0.148						1.43
2006 survey											
1995	0.995	0.966	0.438	0.245	0.231						1.51
1996	0.998	0.962	0.423	0.200	0.186						1.46
1997	0.991	0.961	0.392	0.197	0.216						1.41
1998	0.995	0.964	0.403	0.188	0.237						1.44
1999	0.994	0.964	0.379	0.210	0.237						1.42
2000	0.996	0.955	0.410	0.188	0.198						1.43
2001	0.990	0.958	0.401	0.165	0.247						1.41
2002	0.993	0.968	0.382	0.123	0.179						1.38
2003	0.993	0.946	0.400	0.113	0.196						1.37
2004	0.998	0.966	0.440	0.117	0.118						1.44
2005	0.999	0.969	0.437	0.081	0.071						1.43

CHAPTER FIVE

TRANSITION TO SECOND AND THIRD BIRTH: ROLE OF FAMILY PLANNING POLICY AND WOMEN'S EDUCATION IN CHINA

ABSTRACT

Background: China has achieved a dramatic transition towards low fertility over the last three decades, which has contributed to economic growth on one hand, but has also led to accelerated population aging, distorted sex ratios, and changes to the Chinese family and kinship system on the other hand. Recently, the strict family planning policy has been relaxed to a universal two child policy. Some fear that the relaxation of the policy will stimulate a baby boom; others argue that an increase in fertility would be of benefit to the country. In an attempt to contribute to this debate, we examine how family planning policies have impacted upon changes in parity transitions among women in China and how this has been modified by education.

Objective: to examine the effect of family planning policies on the second and third birth transition; and to identify whether family planning policies have had differential effects on women according to their educational status over time.

Methods: The observations are based on five successive China Population and Family Planning Survey data collected during 1982-2006. The estimates are obtained from pooled observations on birth history information. The analysis considered a discrete time complementary log-log survival model. Family planning policies are measured in relation to individual exposures to particular policy regimes during the study birth interval, which allows for a more complete analysis compared to existing studies.

Results: Parity progression ratios to second birth and third birth tend to be lower after the family planning policies were introduced and the impact of policy persists even after controlling for demographic and socio-economic factors; there is a negative effect of increasing women's education on parity transition; moreover, family planning policies have had differential effects on women from different educational groups.

Conclusions: Family planning policies and women's education both play important role in shaping fertility behaviour in China. The low fertility achieved in China is attributed to a combined effect of population policies and increase in the levels of women's education. Had the strict FP policy been relaxed, or not in place at all, then with the increase in women's education alongside other social and economic development, the fertility level might not be as high as is assumed. The findings provide evidence in support for those arguing that the relaxation of the policy will not be accompanied by a baby boom and a return to above replacement rate fertility.

5.1 INTRODUCTION

China has transitioned to a low fertility rate for over the last three decades, contributing to economic growth on the one hand, and the consequences of accelerated population aging, distorted sex ratios, and changes to the Chinese family and kinship system on the other hand. Recently, there has been active public debate about the future of the family planning policy. Some commentators have expressed fears that relaxation of the policy would stimulate a baby boom (Zhai and Li 2014; Feng 2014); others argue an increase in fertility would actually benefit the country (Gu and Li 2010; Cai 2010; Wang, Cai and Gu 2012). Recent anecdotal evidence suggests that fewer couples have shown an interest in having a second child since the policy was relaxed in 2013 which allows couples to have two children if either parent is the only child (British Broadcasting Corporation (BBC) 2015). In an attempt to contribute to this debate, we examine the effect of FPP on the second and third parity transitions in China at the individual level and across time.

Since 1970s, family planning policies in China have been deliberately constructed as institutional arrangements and specific programmes through which the Government influences individual reproductive choices and fertility behaviour. Previous studies have highlighted the influence of FPP on fertility in China (Tien 1984; Feeney and Yu 1987; Feeney and Wang 1993; Freedman and Wang 1993; Yang and Chen 2004; Retherford et al 2005; Chen et al 2009). The evolution of FPP in China and its impact on fertility change on a macro level is systematically assessed in Chapter III. However, it is worth recapping the typology of FPP regimes and TFR change under each alternative policy regimes here. Over time, the policies can broadly be divided into three key phases. The first phase was ‘Later, longer, fewer FPP’ (1973–1979); The second phase was ‘one child FPP’ (1979–1984); The third phase (1985–2015) of differentiated FPP can be broadly sub-divided into three types based on the number of children per couple permitted: ‘one child’, ‘one and half children’ and ‘two and children’. The time period and features of each policy, along with the provinces covered and the associated population coverage is listed in Table 5.1 From 1970 onwards fertility in China declined

rapidly, from more than 6 in the beginning of 1970s, reaching replacement level in early 1990s, to well below replacement in the most recent two decades. This outcome is largely attributable to the 'Later, Longer, Fewer' FPP and the subsequent more strict family planning policies implemented by the Chinese government. TFRppr under the five alternative policy regimes (listed in Table 5.1) by time is illustrated in Figure 5.1.

Table 5.1. Description of the Typology of FPP

Time period	**Type of FPP**	**Regions/ provinces covered**	**Nature/ features of the policy**	**Per cent of population covered**
1973-1978	FPP1: 'Later, longer, fewer '	Nationwide	The age at first marriage was encouraged to be later than 23 years old for females and 25 years old for males. Childbearing age was encouraged to be later than 24 years old for females. At least 3 years between births were recommended and the total number of children recommended was no more than two.	100
1979-1984	FPP2: 'One child'	Nationwide	Couple can have only one child	100
1985-2015	FPP3 :'Differentiated one child '	Nationwide urban *Hukou* residents (FPP3a) Rural *Hukou* residents in six provinces (municipalities) (FPP3b): Beijing, Tianjin, Shanghai, Jiangsu, Sichuan and Chongqing	Couple can have only one child	36
	FPP4: 'Differentiated one and half children'	Rural *Hukou* residents in nineteen provinces (autonomous regions and municipalities): Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Guizhou, Shaanxi, Gansu.	If the first child is a girl, then a second child is permitted	53
	FPP5: 'Differentiated two children'	Rural *Hukou* residents in five provinces (autonomous regions): Hainan, Yunnan, Qinghai, Ningxia, Xinjiang	Couple can have two children	10
2016 onwards	Universal 'Two children'	Nationwide	Couple can have two children	100

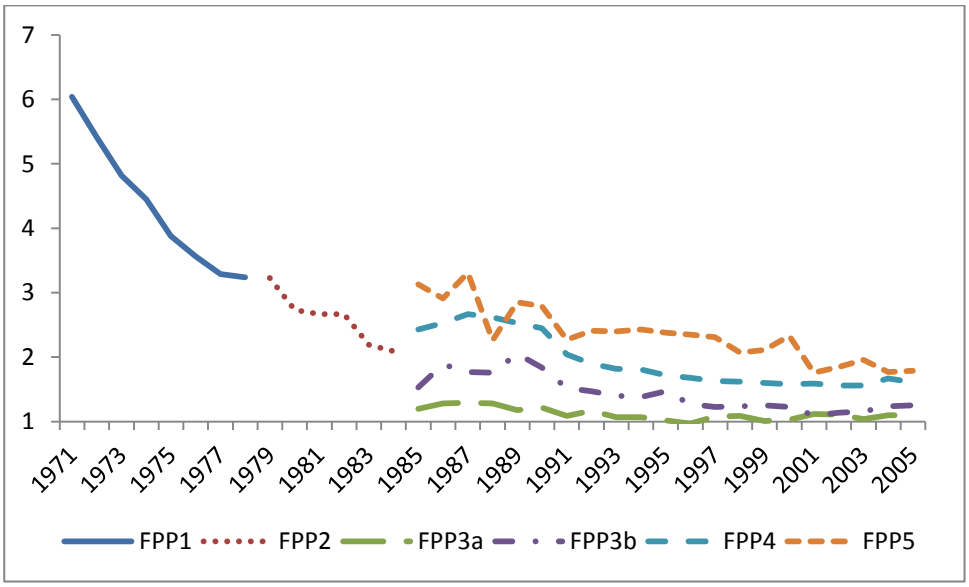


Figure 5.1. TFR_{ppr} under the Five Alternative Policy Regimes by Time.
Source: Table 4.1, 4.3, 4.4, 4.5, 4.6 and 5.1.

Theoretically, fertility in any society is determined by socioeconomic and environmental (including policy) factors which operate through a set of intermediate variables or proximate determinants (Bongaarts 1978; Bongaarts and Potter 1983). Globally, demographic data have shown considerable variation in fertility rates among women from various socioeconomic groups within and between regions and countries. Fertility is generally higher in rural than in urban areas and cities, higher among uneducated women and lower incomes groups (United Nations 1987). Education is often used as proxy indicator for opportunity costs and women's status, which are relevant to fertility analysis (Mason 1986). Demographic transition theory and innovation-diffusion theories agree that education has a major role to play in the fertility decline (Cleland and Wilson 1987). Empirical evidence has shown that better female education is usually associated with lower fertility at both the population and the individual levels (Caldwell 1980; United Nations 1987, 1995; Castro Martín 1995; Jejeebhoy 1995; Cleland 2002; Bongaarts 2003; James et al. 2012). The pace of social and economic development, driven partly by the improvements in female education and employment opportunities, was incompatible for childbearing because of high economic and non-economic costs in raising children. The community level education may also influence the social and reproductive norms. Given a large proportion of highly

educated women in the community, less educated neighbours may adopt their reproductive behaviour. These behaviours at the individual and community levels in turn can accelerate the pace of demographic transition (Colleran et al 2014). However, educational differentials in fertility change over the course of a demographic transition, because they are conditioned by socio-economic development, social structure and cultural context. Cleland (2002) argue that in most societies, fertility differentials by education should shrink over time and converge at the end of the transition. By contrast, Bongaarts (2003), concluded based on the empirical data analysis that fertility differentials by education remain significant even in post-transitional countries. In the Chinese context, at sub-region level or county level, there is evidence to suggest that education has had no noticeable effect and overall socioeconomic factors have played only a limited role (Bongaarts and Greenhalgh 1985; Retherford et al. 2005); others however argue that the fertility decline should not be solely attributed to FPP, because socio-economic development matters (Tien 1980; Poston and Gu 1987; Poston 2000; Yang and Chen 2004; Cai 2010).

Aggregate data often have limited explanatory power to explain the causal effects underlying the relationship between FPP and fertility and the mediating influence of socioeconomic factors. Moreover, existing constructs of FPP measures have several limitations in terms of incompleteness, endogeneity, and randomness (Wang 2012). So far, little research has been carried out to understand the potential association between FPP and educational disparities in parity transition in China. The aim of this study, therefore, is to examine the effect of FPP on the transition to second and third birth and to determine whether FPP have differential effects on educational groups over time. We hypothesize that i) the introduction of FPP reduced the parity progression risk to second and third births; ii) there is an inverse relationship between women's education and parity transition; and iii) FPP has a differential effect on educational groups.

5.2 Data and method

Data used for the analysis are drawn from a consecutive series of the China Population and Family Planning Surveys conducted during 1982-2006. The main purpose of the

series of surveys was to examine fertility, contraceptive use and other reproductive health issues. These surveys contain complete birth histories of women of reproductive ages (15-49) and the data were collected in 1982, 1988, 1997, 2001 and 2006 respectively, except for the 1992 survey where the birth histories of only the last four children were recorded. All surveys were designed to be nationally representative, but for the exclusion of Tibet in 1982 and 2006 survey. For this study, data from the 1982, 1988, 1997, 2001 and 2006 surveys are used, and Tibet is excluded. The systematic assessment of the data in Chapter III indicated good quality and consistent records of marriage and birth history information. Information about the surveys and data quality is also reported in several academic studies (Feeney and Yu 1987; Feeney and Wang 1993; Feeney and Yuan 1994; Morgan et al. 2009). The distribution of women aged 15-49 by selected socio-economic characteristics is shown in Table 5.2. Over the study period, the proportion of women with an urban residence, and average household annual income both in rural and urban areas, have increased. The percentage of women with higher education has increased considerably across time. However, about 34 per cent of women remain in the lower education category in 2006. There is also a cohort effect which is clearly reflected in gradual increase of percentage of younger cohort with higher education. Consistent education level for the same cohort indicates the reliability of this measurement. For instance the age groups 45-49 (2006 survey), 40-44 (2001 survey), 35-39 (1997 survey), 25-29 (1988 survey) and 20-24 (1982 survey) have similar education levels (Figure 5.2).

Table 5.2. Percentage Distribution of Women Aged 15-49 by FPP and Selected Socio-Economic Characteristics: 1982, 1988, 1997, 2001, 2006 Surveys

FPP and selected socio-economic characteristics	1982	1988	1997	2001	2006
Rural/urban residence					
Urban	16.9	24.5	23.4	25.5	34.3
Rural	83.1	75.5	76.6	74.5	65.7
Ethnicity					
Han	93.3	89.5	90.9	90.6	89.1
Non-Han	6.7	10.5	9.1	9.4	10.9
Education					
Primary school and below	67.7	57.9	51.2	45.2	33.7
Lower secondary school	22.2	28.2	32.2	36.1	41.6
Upper secondary and above	10.1	13.9	16.6	18.8	24.7
Annual per capita household income (RMB Yuan)					
In urban	535	1180	5160	6860	11760
In rural	270	545	2090	1366	3587
N	251,513	568,526	15,178	39,508	33,257

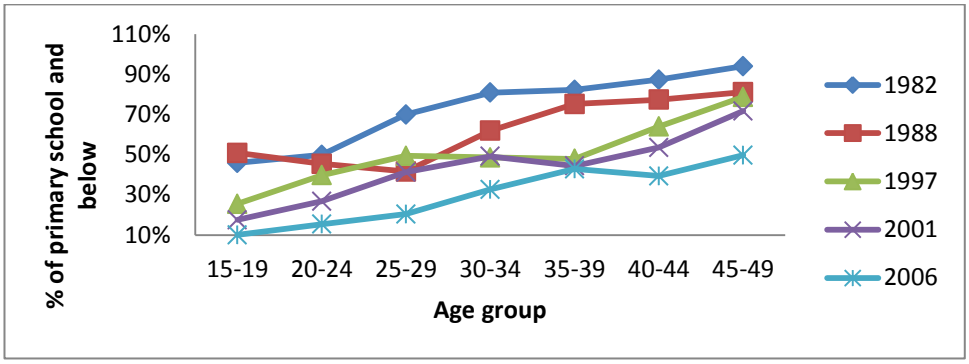


Figure 5.2. Percentage Distribution of Women by Different Age Group and Primary School and Below Education: 1982, 1988, 1997, 2001, 2006 Surveys

Since the aim of the study was to examine the effect of FPP on the second and third birth transition, I restricted the sample to participants who have had at least one child or two children. Discrete time survival models are employed with time-varying and time-invariant covariates to analyse incidence and spacing of births. The unit of analysis is the person-year. Expanded samples of person-year observations are created. Women are observed until the event of interest (2nd or 3rd birth) has occurred or till the end of each survey. One individual can contribute to more than one observation. The sample sizes in Table 5.3 indicate the number of person-year observations in the analysis datasets.

Table 5.3. Expanded Sample Sizes by Parity among Women Aged 15-49: 1982, 1988, 1997, 2001, 2006 Surveys

Parity transition	1982	1988	1997	2001	2006
1-2	420,254	1,125,587	49,300	154,765	155,906
2-3	421,606	1,002,141	40,186	108,988	90,829

Statistical modelling and analytical approach

The outcomes are the risks to 2nd or 3rd birth transition. Two separate discrete time complementary log-log survival models (CLL model) were specified with time measured from the previous birth, parity 1-2 and parity 2-3. The risk or hazard h(t) reflects the probability of an event's occurrence, conditional on survival and covariates,

to some time t.

$$\text{cloglog}[h(t)] = \log(-\log[1-h(t)]) = (\alpha_0 + \alpha_1 T_1 + \alpha_2 T_2 + \ldots \alpha_{10} T_{10}) + (\beta_1 X_1 + \beta_2 X_2 + \ldots \beta_k X_k) \quad (1)$$

$$h(t) = 1 - \exp[-\exp(\alpha_0 + \alpha_1 T_1 + \alpha_2 T_2 + \ldots \alpha_{10} T_{10}) + (\beta_1 X_1 + \beta_2 X_2 + \ldots \beta_k X_k)] \quad (2)$$

Equation (1) indicates that the cloglog transformed population hazard – cloglog[h(t)], is modelled as a linear combination of predictor values, in which T_1 to T_{10} are ten duration dummy variables, reflecting birth intervals; X_1 to X_k are selected predictors; α_1 to α_{10} and β_1 to β_{10} are the coefficients and α_0 is the intercept. With the estimated parameters, the predicted model-based discrete time hazard or conditional probability functions can easily be calculated using equation (2).

The CLL model is estimated by maximum likelihood, yielding estimates of both coefficients and baseline hazard function (Box-Steffensmeier and Jones 2004, Singer and Willett 2003, Allison 1982). An anti-logged coefficient from the model with a clog-log link is a hazard ratio. The coefficients of predictor variables in the CLL model have the same interpretation as in the continuous-time Cox proportional hazards model. One-unit increase in a predictor variable multiplies the hazard by $\exp(\beta_i)$, where β_i is the coefficient of the predictor variable and $\exp(\beta_i)$ is called hazard ratio or relative risk. Baseline hazard function captures duration effects, fitted as a step function in this study with 10 time dummies because the birth interval was truncated at the 10th year. In the equation (1), $(\alpha_0 + \alpha_1 T_1 + \alpha_2 T_2 + \ldots \alpha_{10} T_{10})$ model the shape of the baseline hazard function, which is the population hazard function when all predictors X_1 to X_k are set to 0.

The advantages of applying the CLL model to study parity progression were described in a previous paper by Retherford et al. (2010). First, the model can easily handle both left censoring and right-censoring, thereby enabling application of the model to period data. Second, when a complementary log-log (cloglog) link is used instead of a logit link, the parameter estimates from the model can be directly interpreted as ratios of continuous time hazard rates after anti-logging them. Third, in contrast to Cox regression, the CLL model provides an estimate of the shape of the baseline hazard

function. Finally, the model can be estimated using widely available standard logistic regression software packages.

Separate CLL models applying 1982, 1988, 1997, 2001 or 2006 survey data are fitted with the risks to 2nd or 3rd birth transition as the outcome. Initial analysis shows some of the main effects to be similar (Appendix Table 5.5a-5.14a), allowing the models to be combined. A multivariate life table is constructed after the CLL model is fitted, from which the parity progression ratios are derived (Retherford et al. 2010).

Statistical software, StataSE12 is used for the CLL modelling (StataCorp. 2011). STATA uses the first category of dummy codes predictor variables as a default of the reference category. The birth interval is normally greater than one and the incidence of having the next birth within the first year after a birth very low. As a result we may get very high hazard ratios if we use year 1 as the reference category and thus we chose year 10 as the reference category.

Measurements

The main explanatory variable is FPP. The policies change over time and vary according to certain criteria, e.g. rural/urban (*Hukou*) and geographic location. Most existing measures of China's FPP have been constructed at the national level without taking regional nuances or changes in the policy over time into account and thus have failed to reflect people's exposure to the policy. Results may not be reliable if incomplete, endogenous, or homogeneous measures of FPP are used. In this study, we integrate the policy variations more completely, heterogeneously, and exogenously by using the five cross-sectional data of the China Population and Family Planning Surveys, which cover the whole period of FPP evolution. FPP is measured as time varying variable and take into account both changes in policy over time as well as distinguishing between differential policies implemented after 1985 in urban and rural areas in different provinces across China. Exact exposure status to the particular policy is measured by each of the observation. Observations exposed to *no FPP* before year 1972

are coded as '0'; those exposed to the '*later, longer, fewer FPP*' prevalent during the years 1973 to 1978 are coded as '1'; those exposed to the '*nationwide one child FPP*' in operation during the years 1979 to 1984 are coded as '2'; those exposed to the '*differentiated one child FPP*' that was in place for urban hukou residents nationwide and rural hukou residents in 5 provinces after year 1985 to current are coded as '3'; those exposed to the '*one and half children FPP*' in place for rural hukou residents in 19 provinces after year 1985 to current are coded as '4'; and those exposed to '*two and more children FPP*' for rural hukou residents in operation in 5 provinces after year 1985 to current are coded as '5'.

The educational attainment of the respondents is measured using three categories: primary education and below, lower secondary education and upper secondary and above education. Several demographic and socio-economic variables are considered in the models, including age at the previous parity, rural/urban residence, ethnicity, child sex composition, provincial level contraceptive prevalence and household income. Geographic variable, province is controlled. Given the data is pooled from several surveys, survey effects are also controlled in the model. The definition and coding of the variables is presented in the Appendix Table 5.1a. The number of woman-years in each category for the covariates is presented in Appendix Table 5.2a. The duration categories show that the exposed-to-risk in each study year is large.

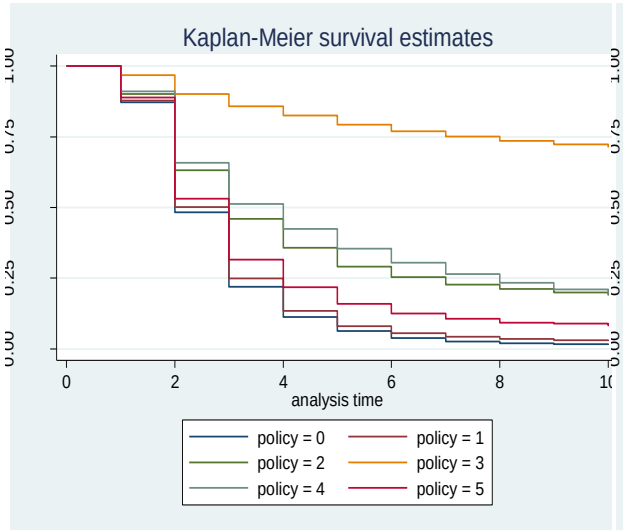
5.3 RESULTS

Among those women aged 15-49 with parity one or with parity two, the probability of surviving (not progressing to parity two or to parity three) beyond 10 years by different FPP and education is shown in Figure 5.3. The curves are the survivor function estimated by Kaplan-Meier. Women regulated under the 'differentiated one child FPP' had the highest survivorship, while those with 'no FPP' experienced the lowest survival. In between is the probability of surviving for women regulated under the 'differentiated one and half child FPP', 'nationwide one child FPP', 'differentiated two children FPP'

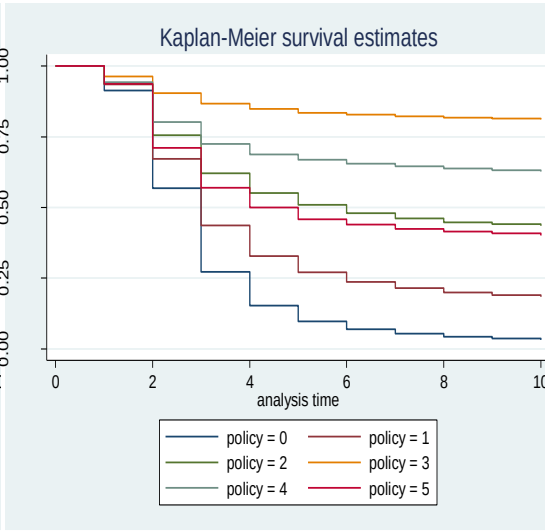
and the ‘later longer fewer FPP’. These results are consistent with what we would expect both in terms of the period in which the policies were in operation and also differentiated nature of the policies. The surviving sequence of progressing from parity 2-3 among subgroup regulated by different family planning policy is similar to that progressing from parity1-2. However, the gap of survivor probabilities between subgroups is larger for parity 2-3 progression than parity 1-2 progression.

As shown in Figure 5.3, for both parity1-2 and parity 2-3 transition, the probabilities are higher for women with primary school education, followed by those with lower secondary education. Women with upper secondary education have the lowest probabilities. Log rank tests indicate that difference between FPP subgroups and education subgroups for both parity 1-2 progression and parity 2-3 progression is significant.

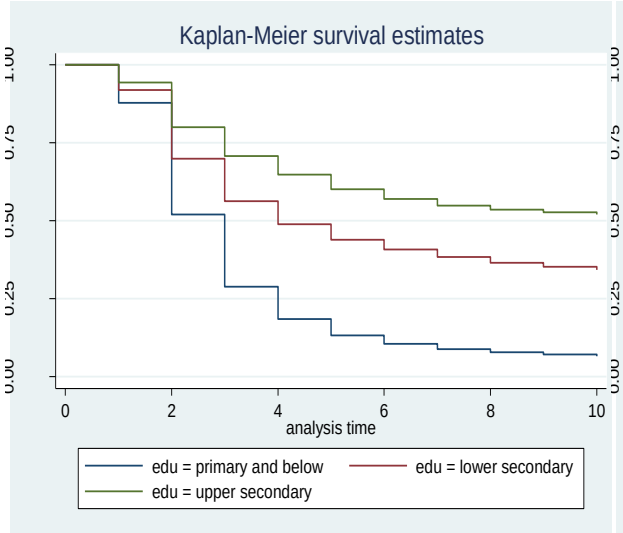
FPP and parity 1-2 progression



FPP and parity 2-3 progression



Education and parity 1-2 progression



Education and parity 2-3 progression

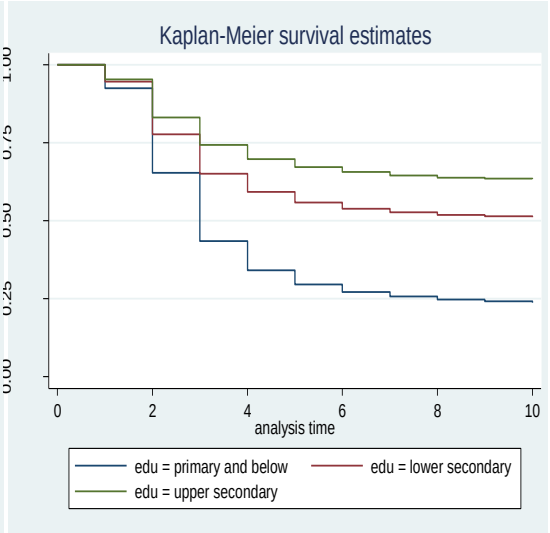


Figure 5.3. Effect of FPP and Education on Progression Parity 1-2 and Parity 2-3, Women Aged 15-49 (pulled data)

Results from the multivariate analysis

Table 5.4 shows the results of multivariate complementary log-log models for parity 1-2 transition. Model 1 presents the main effect of the different FPP regimes and education. A significant decrease in risk of transition to parity two was observed for the later FPPs.

Compared with no policy regulation, the relative risk of parity transition from parity 1-2 among women regulated under the 'Later, longer, fewer FPP' has no significant difference; 'Nationwide one child FPP', 'Differentiated one child FPP', 'Differentiated one and half children FPP' and 'Differentiated two and more children FPP' are associated with 34 per cent, 76 per cent, 39 per cent and 26 per cent lower risk of a second birth respectively. Compared to lower education, higher educated women have a lower risk of parity progression. In contrast to women with primary school and below, women with lower secondary, and upper secondary or above education are associated with 17 per cent and 32 per cent lower risk respectively of experiencing a second birth.

Women with higher socio-economic status have lower relative risk of parity transition. Women living in urban areas and those from higher household income provinces have lower risk of experiencing a second birth compared to their rural counterparts and those from lower household income provinces. Regarding the demographic characteristics, a higher age at first birth is associated with a lower transition risk. Women belonging to Han ethnicity have slightly higher transition risk compared to Non-Han counterparts. Having a son is associated with 15 per cent lower risk of having a second birth compared to those having a daughter.

Table 5.4. Estimated Relative Risk of Parity 1-2 Progression among Women Aged 15-49.

	Model1 no interactions			Model2 with interactions		
	exp(b)	Std.	P>z	exp(b)	Std. Err.	P>z
year1	0.75	0.02	0.000	0.76	0.02	0.000
year2	2.98	0.09	0.000	3.04	0.09	0.000
year3	3.49	0.10	0.000	3.55	0.10	0.000
year4	2.95	0.08	0.000	2.99	0.09	0.000
year5	2.58	0.08	0.000	2.62	0.08	0.000
year6	2.04	0.06	0.000	2.06	0.06	0.000
year7	1.72	0.05	0.000	1.74	0.05	0.000
year8	1.43	0.05	0.000	1.44	0.05	0.000
year9	1.16	0.04	0.000	1.16	0.04	0.000
year10 (ref)						
Later, longer, fewer FPP	1.00	0.00	0.652	1.02	0.00	0.000
Nationwide one child FPP	0.66	0.00	0.000	0.77	0.00	0.000
Differentiated one child FPP	0.24	0.00	0.000	0.39	0.01	0.000
Differentiated one and half children FPP	0.61	0.00	0.000	0.63	0.00	0.000
Differentiated two and more children FPP	0.74	0.01	0.000	0.77	0.01	0.000
No FPP(ref)						
Han Ethnicity	1.01	0.01	0.084	1.01	0.01	0.079
Non-Han ethnicity(ref)						
Lower secondary school	0.83	0.00	0.000	1.23	0.01	0.000
Upper secondary and above	0.68	0.01	0.000	1.18	0.02	0.000
Primary school (ref)						
Rural residence	1.28	0.01	0.000	1.30	0.01	0.000
Urban residence(ref)						
Age at the previous parity	0.97	0.00	0.000	0.97	0.00	0.000
At least one son	0.85	0.00	0.000	0.84	0.00	0.000
Only daughter (ref)						
Contraceptive prevalence	1.00	0.00	0.000	1.00	0.00	0.000
Average household income	0.95	0.00	0.000	0.96	0.00	0.000
1988 survey	1.10	0.00	0.000	1.09	0.00	0.000
1997 survey	1.14	0.01	0.000	1.13	0.01	0.000
2001 survey	1.11	0.01	0.000	1.08	0.01	0.000
2006 survey	1.27	0.01	0.000	1.23	0.01	0.000
1982 survey (ref)						
30 provinces skipped						
Lower secondary school* Later, longer, fewer FPP				0.78	0.01	0.000
Upper secondary and above* Later, longer, fewer FPP				0.72	0.02	0.000
Lower secondary school* Nationwide one child FPP				0.46	0.01	0.000
Upper secondary and above* Nationwide one child FPP				0.39	0.01	0.000
Lower secondary school* Differentiated one child FPP				0.37	0.01	0.000
Upper secondary and above* Differentiated one child FPP				0.24	0.01	0.000
Lower secondary school* Differentiated one and half children FPP				0.66	0.01	0.000
Upper secondary and above* Differentiated one and half children FPP				0.66	0.01	0.000
Lower secondary school* Differentiated two and more children FPP				0.66	0.02	0.000
Upper secondary and above* Differentiated two and more children FPP				0.52	0.03	0.000
Primary school*NO FPP (ref)						
_cons	0.21	0.01	0.000	0.20	0.01	0.000

Source: pooled data from 1982, 1988, 1997, 2001 and 2006 surveys

Table 5.5 shows the results of multivariate complementary log-log models for the transition from parity 2 to 3. Model 1 presents the main effect of FPP and education. The family planning policy regime has a bigger influence on the risk to further parities. Compared to no policy, exposure to the Later, longer, fewer FPP, Nationwide one child FPP, Differentiated one child FPP, Differentiated one and half children FPP and Differentiated two and more children FPP are associated with 32 per cent, 62 per cent, 80 per cent, 73 per cent and 68 per cent lower risk respectively of experiencing the third birth. Compared to lower education, higher educated women have a lower risk of parity progression. In contrast to women with primary school and below, having lower secondary and upper secondary or above education are associated with a 20 per cent and 36 per cent lower risk of a third birth respectively.

Living in urban areas or higher household income provinces is associated with lower transition risk compared to their counterparts. The older the women were when they had their second child, the lower transition risk of third birth. Women belonging to Han ethnicity have lower transition risk compared to Non-Hans. Finally, having at least one son is associated with 36 per cent lower risk of third birth than those having two daughters. It is noted that coefficients are very large for years 2 and 3, also see Appendix 5.10a-5.14a. This might be because of very low transition rate among reference group.

Table 5.5. Estimated Relative Risk of Parity 2-3 Progression among Women Aged 15-49.

	Model1 no interactions			Model2 with interactions		
	exp(b)	Std. Err.	P>z	exp(b)	Std. Err.	P>z
year1	1.59	0.06	0.000	1.56	0.06	0.000
year2	7.26	0.29	0.000	7.14	0.28	0.000
year3	9.85	0.39	0.000	9.68	0.38	0.000
year4	7.04	0.28	0.000	6.92	0.27	0.000
year5	4.96	0.20	0.000	4.89	0.20	0.000
year6	3.50	0.14	0.000	3.46	0.14	0.000
year7	2.53	0.11	0.000	2.51	0.11	0.000
year8	1.83	0.08	0.000	1.82	0.08	0.000
year9	1.27	0.06	0.000	1.26	0.06	0.000
year10 (ref)						
Later, longer, fewer FPP	0.68	0.00	0.000	0.70	0.00	0.000
Nationwide one child FPP	0.38	0.00	0.000	0.40	0.00	0.000
Differentiated one child FPP	0.20	0.00	0.000	0.21	0.01	0.000
Differentiated one and half children FPP	0.27	0.00	0.000	0.26	0.00	0.000
Differentiated two and more children FPP	0.32	0.01	0.000	0.33	0.01	0.000
No FPP(ref)						
Han Ethnicity	0.89	0.01	0.000	0.89	0.01	0.000
Non-Han ethnicity(ref)						
Lower secondary school	0.80	0.01	0.000	0.96	0.01	0.000
Upper secondary and above	0.64	0.01	0.000	0.81	0.02	0.000
Primary school (ref)						
Rural residence	1.38	0.01	0.000	1.38	0.01	0.000
Urban residence(ref)						
Age at the previous parity	0.95	0.00	0.000	0.95	0.00	0.000
At least one son	0.64	0.00	0.000	0.64	0.00	0.000
Only daughter (ref)						
Contraceptive prevalence	1.01	0.00	0.000	1.01	0.00	0.000
Average household income	0.94	0.00	0.000	0.94	0.00	0.000
1988 survey	1.09	0.00	0.000	1.08	0.00	0.000
1997 survey	1.01	0.02	0.664	1.00	0.02	0.942
2001 survey	1.04	0.02	0.006	1.03	0.02	0.029
2006 survey	1.17	0.02	0.000	1.16	0.02	0.000
1982 survey (ref)						
30 provinces skipped						
Lower secondary school* Later, longer, fewer FPP				0.81	0.01	0.000
Upper secondary and above* Later, longer, fewer FPP				0.63	0.02	0.000
Lower secondary school* Nationwide one child FPP				0.62	0.01	0.000
Upper secondary and above* Nationwide one child FPP				0.55	0.02	0.000
Lower secondary school* Differentiated one child FPP				0.79	0.04	0.000
Upper secondary and above* Differentiated one child FPP				0.77	0.06	0.000
Lower secondary school* Differentiated one and half children FPP				0.94	0.02	0.009
Upper secondary and above* Differentiated one and half children				1.12	0.04	0.003
Lower secondary school* Differentiated two and more children FPP				0.68	0.03	0.000
Upper secondary and above* Differentiated two and more children				0.87	0.07	0.098
Primary school*NO FPP (ref)						
_cons	0.10	0.01	0.000	0.10	0.01	0.000

Source: pooled data from 1982, 1988, 1997, 2001 and 2006 surveys

Model 2 in Table 5.4 and Table 5.5 examines whether the effect of the FPP regime on parity transition depends on the level of education. The significant interaction terms indicate that the impact of the FPP regime on parity transition is mediated by the level of women's education. To aid the interpretation of the interaction between FP policy and education, we set all variables in the model to their mean value and estimated the probabilities for all combinations of education and FPP regime. Estimated parity progression ratios for every combination of education and FPP are given in Table 5.6 and Figure 5.4. The three levels of education are shown as three different lines and the six types of FPP regime are presented on the x-axis of the graph, with the differentiated policies (policy3, policy4, and policy5) from 1985 presented separately. From the graphs it is clear that the effect of the FPP regime differs accordingly to the level of education.

The plot shows that under the same FPP, women with higher education experience a lower parity progression for both parity 1-2 and parity 2-3; and high educated women are more likely to follow compliance with the policy. For Parity 1-2, under no FPP regime, all three education groups have very high progression. When the Later, longer, fewer FPP (policy 1) was introduced, the parity progression ratio to second child started to decline among high and medium educated women; when even more strict nationwide one child FPP (policy 2) was introduced, the parity progression ratio to second child of high educated women decline much more than that of low educated women.

In the strictest differentiated one child FPP regime (policy 3), for all women, irrespective of education levels, the risks to parity progression declined. The educational differentials are small in the no FPP, Later, longer, fewer FPP and differentiated one and half children FPP regime (policy regime 4). In contrast, the educational differentials are large in the nationwide one child FPP, differentiated one child FPP and differentiated two and more children FPP regime (policy regime 5). Interestingly, there was a potential 'bounce back' between policy 2 and policies 4/5 – indicating that in circumstances where the strict one child policy was relaxed, a higher proportion of educated women actually went on to have a second birth– this seems offer evidence to support the argument that there might be a baby boom.

For Parity2-3, under all policy regimes, women with low education are the most likely to have third child, followed by women with medium education and high education, with the only exception being amongst those women exposed to differentiated two and more children FPP regime, where high educated women have slightly higher parity progression ratio of third birth than that of medium educated women. From no FPP to Later, longer, fewer FPP, the parity progression to third birth among all education level declined, with the pace of decrease being fastest among high educated women, followed by medium and low educated. From Later, longer, fewer FPP to nationwide one child FPP, parity progression ratios continued to drop almost in parallel across three education levels. The educational differentials narrow as China moves from the nationwide one child FPP to differentiated three types of FPP. The educational differentials are small in no FPP regime, and then they widen during the Later, longer, fewer FPP and nationwide one child FPP regimes, and then converge again during the differentiated three types of FPP.

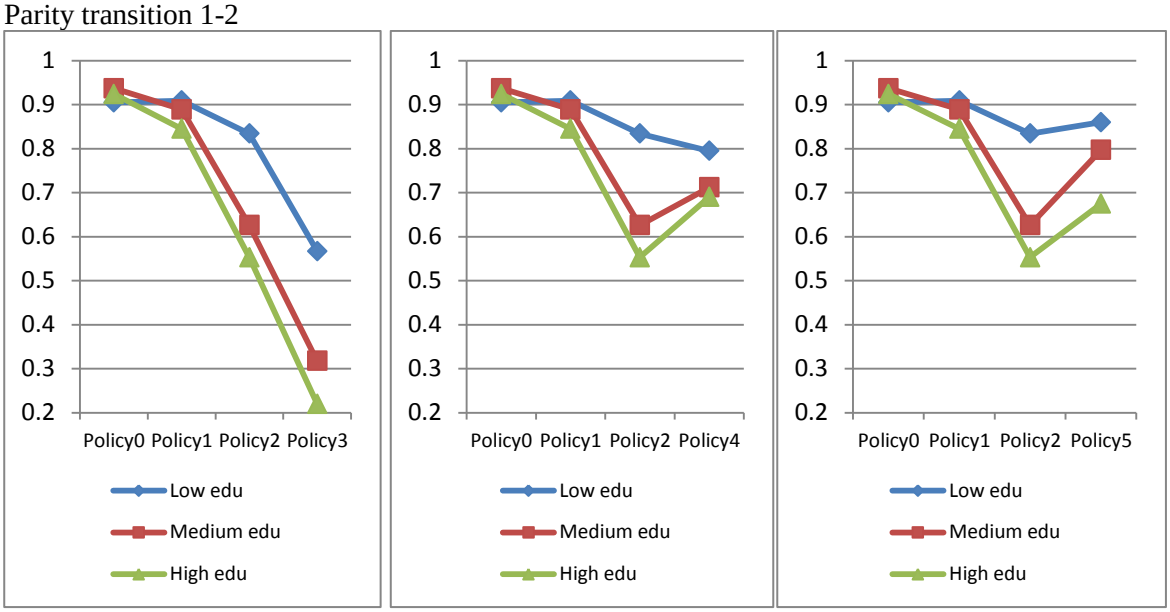
When women have choice to have a second or third child during no FPP regime and in differentiated two and more children FPP, high educated women are more likely to have fewer children. For instance, parity progression ratio of parity2-3 was lower for high educated women than that of low and medium educated women during no FPP regime; and parity progression ratio of parity1-2 and parity2-3 was negatively associated with education during differentiated two and more children FPP. It should be noted that the proportion of women in the high and medium education categories who were exposed to the relatively relaxed FPP regime was small. Education distribution by different FPP (Appendix Table 5.3a and Table 5.4a) shows that for parity1-2, less than half highly educated women in the one and half children FPP and less than one third in the two children FPP; for parity 2-3, less than one third in the one and half children FPP and less than one fourth in the two children FPP.

Table 5.6. Adjusted Parity Progression Ratios by Policy and Education from Parity 1-2 and Parity 2-3[3].

	Parity transtion1-2			Parity transition2-3		
	Low education	Medium education	High education	Low education	Medium education	High education
No FPP	0.905	0.937	0.924	0.860	0.834	0.775
Later, longer, fewer FPP	0.909	0.889	0.845	0.746	0.637	0.481
Nationwide one child FPP	0.834	0.626	0.553	0.556	0.379	0.302
Differentiate one child FPP	0.567	0.318	0.220	0.322	0.272	0.246
Differentiate one and half children FPP	0.795	0.712	0.690	0.444	0.408	0.400
Differentiate two and more children FPP	0.860	0.797	0.675	0.551	0.430	0.475

[3] Derived from pooled CLL model with interacting education and policy (Model 2 in Table3 and Table4)

Parity transition 1-2



Parity transition 2-3

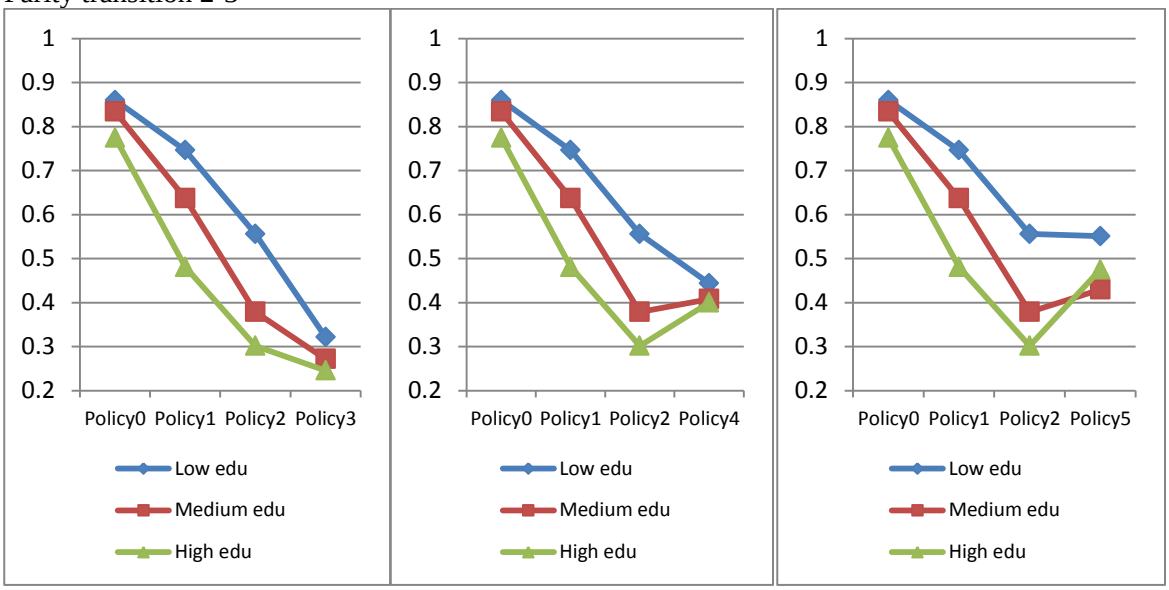


Figure 5.4. Adjusted Parity Progression Ratios by Policy and Education from Parity 1-2 and Parity 2-3.

5.4 DISCUSSION

This analysis found that parity progression ratios to second birth and third birth tend to be lower after adjusting for FPP, even after controlling for demographic and socio-economic factors. It implies that FPP are one of the key determinants of Chinese women's reproductive behaviour, which define the fertility level and change at the aggregate level. Social institutions such as population policy and family planning programmes may influence fertility through changing internalized values concerning family, marriage and fertility; and changing the social and administrative pressures bearing on the reproductive behaviour of individuals and couples (Entwisle and Mason 1985; Bongaarts and Sinding 2011; Demeny 2003). FPP in China are confined to programmatic attempts to increase the availability of contraceptive services, and through massive information, education and communication (IEC) campaigns to convince people the potential value of low fertility for individual, family and the state. Governments complement such efforts within a legislation frame, with administrative pressure or the establishment of outright sanctions for those unwilling to cooperate (Greenhalgh 1986; Gu et al.2007; Gu and Li 2010).

As hypothesised, this study found a negative effect of women's education on parity transition. One potential explanation of the effect of education on fertility is the increased opportunity costs associated with caring for children as education increases. As women acquire skill sets useful in the marketplace with higher levels of educational attainment, they tend to command a higher wage, increasing the value of their time. Education also reduces the incentive to attempt to use fertility as a mechanism to increase family production and income (Cleland and Wilson 1987; Eloundou-Enyegue 1999; Basu 2002; Caldwell 1980, 2005). Education has improved significantly over recent decades in China. Based on census figures, the illiteracy rate dropped from 33.6 per cent in 1964 to 15.9 per cent in 1990 and 6.7 per cent in 2000. Between 1990 and 2000, the number of educated people per 100,000 increased dramatically across China. For example, the proportion of the population educated to primary level increased to 45.5 per cent, high school increased 38.7 per cent, college and those educated to above

college level increased by 1.5 times (Cai, Wang and Wang 2001). If education has a negative association with fertility, increasing the level of women's education is likely to contribute the fertility decline. Our result is in agreement with other studies (Martin 1995; Foster and Roy 1997).

In addition, our results demonstrate that higher educated women are more likely to be the early adopters of the family planning policy, subsequently followed by their lower educated counterparts. There are a number of reasons to believe that education is positively associated with policy compliance. First, schooling increases the returns to legitimate work, raising the opportunity costs of illicit behaviour. In China, higher educated women are more likely to be employed in the public sector and thus may face stricter sanctions if they are resistant to the FPP. Second, education may directly affect the financial or psychic rewards from fertility behaviour itself. Finally, schooling may increase one's patience or risk aversion (Lance and Enrico 2004). On balance, we expect that most of these channels will lead to a negative relationship between education and compliance with a strict FPP. Moreover, diffusion of a small family size norms and knowledge of birth control information and services are likely to emerge among an elite group such as higher educated women and then to be diffused across the social strata (Diamond, Newby and Varle 1999; Bledsoe, Johnson-Kuhn and Haaga 1999; Casterline 2001; Bras 2014; Cleland 2001, 2002). Government endorsement of family planning can have a legitimizing effect that can substantially reduce normative barriers against birth control (Freedman and Berelson 1978; Gertler and Molyneaux 1994). Diffusion then proceeds rapidly when purposive, organized programmes include not only family planning programmes but also legislation and incentives for limiting family size – as has been the case in China.

Why highly educated women have responded with such alacrity to the relaxation of the policy? The possible explanation is that the majority of Chinese women's fertility desire was higher than the policy requirements in the 1980s (Zheng 2004), so when the policy was relaxed, high and medium educated women were more inclined to fulfil their

fertility desire and at the same time show compliance with the policy. While for the lower educated women, during the previous policy regime – nationwide one child FPP, more than 80 percent already had two children, which was not in compliance with the policy. Thus when the policy was relaxed, there was little opportunity for the rest to have a second birth. The parity progression ratio even declined from 0.834 (nationwide one child FPP) to 0.795 (differentiated one and half children FPP), because with the provincial level fertility regulation in place in 1980s and family planning responsible system introduced in early 1990s, the implementation of FPP was getting stricter. However, this finding might not offer evidence to support the argument that there might be a baby boom when the policy relaxed to universal two children, because over time there is a declining pattern in the desired number of children (Poston et al. 2006) and current fertility desire of Chinese women is much lower than that in 1980s. The most recent national fertility intentions survey found that on average, Chinese women's ideal family size is 1.93, lower the replacement level; and those with higher education expressed a lower idea family size (Zhuang et al. 2014).

The initial aims of FPP in China were to enhance economic development to improve social and individual welfare. Policies of one kind or another have now been in force for more than 30 years. The Chinese approach to family planning has been criticised from both international and internal community for its human rights violations ever since the introduction of the authoritarian one child policy in 1979 (Greenhalgh 2003). Nevertheless, under circumstances of low economic development and in a relatively short period of time, the country has achieved a remarkably low birth rate and exponential population growth has been effectively controlled. The decline in fertility has been accompanied by other demographic changes, such as accelerated population aging, distorted sex ratios, and changes to the Chinese family and kinship system (Cai et al 2001; Cai 2010). Recently the FPP has been relaxed to a universal two-child FPP. Concerns have been voiced about an abrupt increase in births which in turn could have a dramatic effect on the allocation of resources, economic development and environmental carrying capacity. However, this study provides evidence that when women have choice to have another child, even within the number allowed under the

FPP, higher educated women opted to have fewer children. The result is generally consistent with some other findings. Recent research in Jiangsu province also found that when women have the choice to have more children, many of them report reflecting on the balance between childbearing and family financial situation and quality of life, and chose to have fewer children (Zheng et al.2009; Mao and Luo 2013). The pilot county of Yicheng where a two child policy has been the operation since 1980s provides further compelling empirical evidence that a baby boom might not appear as predicted (Editorial Board of Population Research (EBPR) 2007).

The above findings support our hypotheses that i) the operation of FPP in China has reduced the parity progression risk to second and third births; ii) there is an inverse relationship between women's education and parity transition; iii) FPP has had a differential effect on educational groups. We conclude that FPP and women's education both play important role in shaping fertility behaviour in China. Low fertility achieved in China is a joint result of policies and, as in other societies, increasing women's education – one of the key indicators of social and economic change in China. The education-fertility relationship is very relevant because the education level of a society can be directly influenced by government policy, and in turn tied up with development prospects. Increasing women's education and women's status will be the most promising strategy of sustained fertility decline. Thus, had the strict FP policy been relaxed earlier, or not in place at all, then with the increase in women's education alongside other social and economic development, fertility levels may not be as high as is assumed.

This study covers the whole period of FPP, allowing evaluation of specify policy exposure much more precisely at individual level and shedding light on the interaction between FP policy and education. We observe the dynamic effects of different FPP regimes on women's childbearing behaviour in that specific period. In order to cover the full historical period, we pooled data from five separate surveys; the observations in each cross section do not refer to the same unit. The crucial question with pooled cross

sections from different time periods is that the same model might not apply in each time period; changes in regulation could influence behaviour to be different; other factors that might cause coefficients in one period to differ from those in others (Bass and Wittink 1975). We use a general way of modelling differences in intercept terms or slope coefficients between periods applying survey dummies. Including interactions between FPP and education allows the coefficient on education to vary across FPP and periods. We also separately modelled the period data by different surveys, and the results indicate consistence. Thus although there are limitations in the method applied, we are confident in the picture that emerges.

The role and influence of national fertility policy interventions and programs have been established in most regions in China. The future research challenge is to apply more updated survey data to further reveal the complex pathways of institutional influence on the course of fertility outcomes. In particular within the context of a move to a two child policy, more attention needs to be paid to understanding the mechanisms of how FPP and education might affect fertility through the demand for children, the supply of children and the costs associated with fertility control.

Appendix

Table 5.1a. Codebook of the Variables

Variables	Definition	Codebook	Time varying or not
Family planning policy	Family planning policy being implemented for legible respondents	0=no FP policy before year 1972 1='later, longer, fewer FPP' during year 1973 to 1978 2='nationwide one child FPP' during year 1979 to 1984 3='one child FPP' for urban hukou residents nationwide and rural hukou residents in 5 provinces after year 1985 to current 4='one and half children FPP' for rural hukou residents in 19 provinces after year 1985 to current 5='two and more children FPP' for rural hukou residents in 5 provinces after year 1985 to current	Yes
Urban/rural residence	Respondents' residence when each of the survey conducted	0=urban 1=rural	No
Ethnicity		0=Non-Han 1=Han	No
Education	Highest education of respondents when each of the survey conducted	0=primary school and below 1=lower secondary 2=upper secondary	No
Child sex composition	Whether have at least one son	0=no son 1=at least one son	No
Age at previous parity	Age of respondents at parity one or parity two.	Continues variable	No
Province	Province where the women were interviewed	30 dummies	No
Survey	Survey which women were interviewed	0=survey in 1982 1=survey in 1988 2=survey in 1997 3=survey in 2001 4=survey in 2006	No
Contraceptive prevalence (provincial level)	Average contraceptive prevalence for each province where interviewed married women located when each survey conducted in year 1982, 1988, 1992, 1997, 2001 and 2006.	Continues variable	Yes, value in 1982 apply to previous years, value in 1988 apply to year 1983 to 1988. And so on. Value in year 2006 apply to year 2002 to 2006.
Household income (provincial level)	Average annual per capita household income, classified by rural and urban and province	Continues variable	Yes, the year value started in 1978. The year before apply the value of year 1978.

Table 5.2a The Number of Woman-Years in Each Category for the Covariates in the Models.

	Parity1-2		Parity2-3	
	Frequency	Percentage	Frequency	Percentage
year1	592,540	31.09	416,407	25.03
year2	478,485	25.11	357,284	21.47
year3	288,764	15.15	245,179	14.74
year4	173,288	9.09	160,333	9.64
year5	116,835	6.13	121,342	7.29
year6	83,295	4.37	98,789	5.94
year7	60,904	3.2	82,317	4.95
year8	46,127	2.42	70,358	4.23
year9	36,420	1.91	60,589	3.64
year10 (ref)	29,154	1.53	51,152	3.07
No FPP(ref)	489,932	25.71	392,774	23.61
Later, longer, fewer FPP	291,994	15.32	345,212	20.75
Nationwide one child FPP	438,197	22.99	439,771	26.43
Differentiated one child FPP	351,023	18.42	121,949	7.33
Differentiated one and half children FPP	305,449	16.03	327,732	19.7
Differentiated two and more children FPP	29,217	1.53	36,312	2.18
Non-Han ethnicity(ref)	161,090	8.45	144,959	8.71
Han Ethnicity	1,744,722	91.55	1,518,791	91.29
Primary school (ref)	1,168,070	61.29	1,259,783	75.72
Lower secondary school	475,819	24.97	290,461	17.46
Upper secondary and above	261,923	13.74	113,506	6.82
Urban residence(ref)	552,229	28.98	332,274	19.97
Rural residence	1,353,583	71.02	1,331,476	80.03
Age at the previous parity				
15-19	301,501	15.82	52,492	3.16
20-29	1,560,361	81.87	1,467,534	88.21
30-49	43,950	2.31	143,724	8.64
Only daughter (ref)	881,677	46.26	793,849	47.71
At least one son	1,024,135	53.74	869,901	52.29
Contraceptive prevalence				
37-69.9	413,726	21.71	399,397	24.01
70-79.9	1,108,464	58.16	1,024,080	61.55
80-93.9	383,622	20.13	240,273	14.44
Average per capita household income (per 100 RMB)				
1.00-2.99 (ref)	573,820	30.38	551,351	33.47
3.00-5.99	685,680	36.3	725,209	44.02
6.00-207	629,615	33.33	370,868	22.51
1982 survey (ref)	420,254	22.05	421,606	25.34
1988 survey	1,125,587	59.06	1,002,141	60.23
1997 survey	49,300	2.59	40,186	2.42
2001 survey	154,765	8.12	108,988	6.55
2006 survey	155,906	8.18	90,829	5.46
30 provinces				
Beijing	58,477	3.07	36,134	2.17
Tianjin	47,884	2.51	28,504	1.71
Hebei	94,287	4.95	85,934	5.17
Shanxi	58,209	3.05	58,255	3.5
Neimenggu	52,257	2.74	47,305	2.84
Liaoning	88,750	4.66	60,914	3.66
Jilin	62,108	3.26	49,217	2.96
Heilongjiang	71,888	3.77	58,101	3.49
Shanghai	65,512	3.44	34,617	2.08
Jiangsu	117,008	6.14	91,474	5.5
Zhejiang	78,309	4.11	71,956	4.32

	Parity1-2		Parity2-3	
	Frequency	Percentage	Frequency	Percentage
Anhui	66,434	3.49	68,251	4.1
Fujian	50,875	2.67	51,404	3.09
Jiangxi	52,812	2.77	53,682	3.23
Shandong	113,788	5.97	93,514	5.62
Henan	94,481	4.96	88,824	5.34
Hubei	79,649	4.18	74,232	4.46
Hunan	76,667	4.02	77,608	4.66
Guangdong	72,380	3.8	70,654	4.25
Guangxi	49,493	2.6	49,080	2.95
Hainan	22,033	1.16	21,392	1.29
Chongqing	8,914	0.47	4,276	0.26
Sichuan	123,415	6.48	99,989	6.01
Guizhou	45,393	2.38	44,366	2.67
Yunnan	56,191	2.95	55,035	3.31
Shanxi	62,257	3.27	61,180	3.68
Gansu	49,499	2.6	48,263	2.9
Qinghai	23,566	1.24	21,354	1.28
Ningxia	22,579	1.18	22,116	1.33
Xinjiang	40,697	2.14	36,119	2.17

Table 5.3a Education Distribution by Different FPP (Parity1-2)

FPP	Low education	Medium education	High education	Total
no FPP before 1972	421,794	47,558	20,580	489,932
	86.09	9.71	4.2	100
'later, longer, fewer FPP' 1973 -1978	227,833	44,039	20,122	291,994
	78.03	15.08	6.89	100
'nationwide one child FPP' 1979- 1984	261,781	117,874	58,542	438,197
	59.74	26.9	13.36	100
'one child FPP' for urban residents nationwide and rural residents in 5 provinces 1985- current	70,892	146,064	134,067	351,023
	20.2	41.61	38.19	100
'one and half children FPP' for rural residents in 19 provinces 1985- current	165,756	112,799	26,894	305,449
	54.27	36.93	8.8	100
'two and more children FPP' for rural residents in 5 provinces 1985- current	20,014	7,485	1,718	29,217
	68.5	25.62	5.88	100
Total	1,168,070	475,819	261,923	1,905,812
	61.29	24.97	13.74	100

Table 5.4a Education Distribution by Different FPP (Parity2-3)

FPP	Low education	Medium education	High education	Total
no FPP before 1972	340,649	37,624	14,501	392,774
	86.73	9.58	3.69	100
'later, longer, fewer FPP' 1973 -1978	270,299	50,349	24,564	345,212
	78.3	14.58	7.12	100
'nationwide one child FPP' 1979- 1984	332,472	75,027	32,272	439,771
	75.6	17.06	7.34	100
'one child FPP' for urban residents nationwide and rural residents in 5 provinces 1985- current	63,437	38,403	20,109	121,949
	52.02	31.49	16.49	100
'one and half children FPP' for rural residents in 19 provinces 1985- current	225,592	81,541	20,599	327,732
	68.83	24.88	6.29	100
'two and more children FPP' for rural residents in 5 provinces 1985- current	27,334	7,517	1,461	36,312
	75.28	20.7	4.02	100
Total	1,259,783	290,461	113,506	1,663,750
	75.72	17.46	6.82	100

Table 5.5a. Estimated Relative Risk of Parity 1-2 Progression among Women Aged 15-49 (1982 survey).

	exp(b)	Std.	P>z
year1	0.99	0.07	0.873
year2	3.99	0.27	0.000
year3	5.10	0.35	0.000
year4	4.51	0.31	0.000
year5	3.94	0.27	0.000
year6	3.15	0.22	0.000
year7	2.41	0.18	0.000
year8	1.86	0.15	0.000
year9	1.47	0.12	0.000
year10 (ref)			
Later, longer, fewer FPP	1.03	0.01	0.000
Nationwide one child FPP	0.61	0.01	0.000
No FPP(ref)			
Han Ethnicity	1.06	0.01	0.000
Non-Han ethnicity(ref)			
Lower secondary school	0.88	0.01	0.000
Upper secondary and above	0.80	0.01	0.000
Primary school (ref)			
Rural residence	1.33	0.06	0.000
Urban residence(ref)			
Age at the previous parity	0.97	0.00	0.000
At least one son	0.89	0.01	0.000
Only daughter (ref)			
Contraceptive prevalence	0.99	0.00	0.000
Average household income	1.01	0.02	0.684
30 provinces skipped			
_cons	0.25	0.03	0.000

Source: data from 1982 survey

Table 5.6a. Estimated Relative Risk of Parity 1-2 Progression among Women Aged 15-49 (1988 survey).

	exp(b)	Std.	P>z
year1	0.82	0.03	0.000
year2	3.37	0.14	0.000
year3	3.93	0.17	0.000
year4	3.28	0.14	0.000
year5	2.83	0.12	0.000
year6	2.20	0.10	0.000
year7	1.83	0.08	0.000
year8	1.43	0.07	0.000
year9	1.14	0.06	0.014
year10 (ref)			
Later, longer, fewer FPP	0.98	0.01	0.000
Nationwide one child FPP	0.79	0.00	0.000
Differentiated one child FPP	0.50	0.01	0.000
Differentiated one and half children FPP	0.91	0.01	0.000
Differentiated two and more children FPP	0.86	0.01	0.000
No FPP(ref)			
Han Ethnicity	0.99	0.01	0.384
Non-Han ethnicity(ref)			
Lower secondary school	0.85	0.01	0.000
Upper secondary and above	0.73	0.01	0.000
Primary school (ref)			
Rural residence	0.94	0.01	0.000
Urban residence(ref)			
Age at the previous parity	0.97	0.00	0.000
At least one son	0.86	0.00	0.000
Only daughter (ref)			
Contraceptive prevalence	1.02	0.00	0.000
Average household income	0.81	0.00	0.000
30 provinces skipped			
_cons	0.11	0.01	0.000

Source: data from 1988 survey

Table 5.7a. Estimated Relative Risk of Parity 1-2 Progression among Women Aged 15-49 (1997 survey).

	exp(b)	Std. Err.	P>z
year1	0.74	0.12	0.053
year2	2.54	0.40	0.000
year3	2.31	0.36	0.000
year4	2.26	0.36	0.000
year5	2.25	0.36	0.000
year6	1.86	0.31	0.000
year7	1.51	0.26	0.018
year8	1.42	0.26	0.054
year9	1.17	0.23	0.434
year10 (ref)			
Later, longer, fewer FPP	0.98	0.06	0.792
Nationwide one child FPP	0.84	0.05	0.003
Differentiated one child FPP	0.52	0.04	0.000
Differentiated one and half children FPP	0.83	0.05	0.002
Differentiated two and more children FPP	0.95	0.11	0.658
No FPP(ref)			
Han Ethnicity	0.98	0.05	0.670
Non-Han ethnicity(ref)			
Lower secondary school	0.77	0.02	0.000
Upper secondary and above	0.55	0.03	0.000
Primary school (ref)			
Rural residence	1.79	0.10	0.000
Urban residence(ref)			
Age at the previous parity	0.98	0.00	0.000
At least one son	0.74	0.02	0.000
Only daughter (ref)			
Contraceptive prevalence	1.00	0.00	0.859
Average household income	0.94	0.00	0.000
30 provinces skipped			
_cons	0.39	0.12	0.003

Source: data from 1997 survey

Table 5.8a. Estimated Relative Risk of Parity 1-2 Progression among Women Aged 15-49 (2001 survey).

	exp(b)	Std.	P>z
year1	0.66	0.05	0.000
year2	2.13	0.16	0.000
year3	1.93	0.14	0.000
year4	1.70	0.13	0.000
year5	1.82	0.14	0.000
year6	1.56	0.12	0.000
year7	1.43	0.12	0.000
year8	1.27	0.11	0.007
year9	1.02	0.10	0.817
year10 (ref)			
Later, longer, fewer FPP	1.46	0.19	0.003
Nationwide one child FPP	1.46	0.19	0.003
Differentiated one child FPP	1.16	0.15	0.262
Differentiated one and half children FPP	1.50	0.19	0.002
Differentiated two and more children FPP	1.64	0.23	0.000
No FPP(ref)			
Han Ethnicity	1.01	0.03	0.719
Non-Han ethnicity(ref)			
Lower secondary school	0.74	0.01	0.000
Upper secondary and above	0.50	0.02	0.000
Primary school (ref)			
Rural residence	1.85	0.07	0.000
Urban residence(ref)			
Age at the previous parity	0.96	0.00	0.000
At least one son	0.66	0.01	0.000
Only daughter (ref)			
Contraceptive prevalence	0.99	0.00	0.000
Average household income	0.96	0.00	0.000
30 provinces skipped			
_cons	0.64	0.15	0.052

Source: data from 2001 survey

Table 5.9a. Estimated Relative Risk of Parity 1-2 Progression among Women Aged 15-49 (2006 survey).

	exp(b)	Std.	P>z
year1	0.58	0.04	0.000
year2	1.71	0.11	0.000
year3	1.40	0.10	0.000
year4	1.29	0.09	0.000
year5	1.47	0.10	0.000
year6	1.38	0.10	0.000
year7	1.48	0.11	0.000
year8	1.44	0.11	0.000
year9	1.14	0.10	0.108
year10 (ref)			
Nationwide one child FPP	1.39	0.18	0.009
Differentiated one child FPP	0.72	0.10	0.014
Differentiated one and half children FPP	1.72	0.22	0.000
Differentiated two and more children FPP	2.36	0.33	0.000
Later, longer, fewer FPP (ref)			
Han Ethnicity	0.88	0.03	0.000
Non-Han ethnicity(ref)			
Lower secondary school	0.76	0.02	0.000
Upper secondary and above	0.53	0.02	0.000
Primary school (ref)			
Rural residence	1.11	0.04	0.002
Urban residence(ref)			
Age at the previous parity	0.98	0.00	0.000
At least one son	0.59	0.01	0.000
Only daughter (ref)			
Contraceptive prevalence	0.96	0.00	0.000
Average household income	0.98	0.00	0.000
30 provinces skipped			
_cons	7.69	1.80	0.000

Source: data from 2006 survey

Table 5.10a. Estimated Relative Risk of Parity 2-3 Progression among Women Aged 15-49 (1982 survey).

	exp(b)	Std.	P>z
year1	0.97	0.07	0.692
year2	4.72	0.34	0.000
year3	7.12	0.52	0.000
year4	5.62	0.41	0.000
year5	4.52	0.33	0.000
year6	3.47	0.26	0.000
year7	2.49	0.19	0.000
year8	1.90	0.16	0.000
year9	1.36	0.12	0.001
year10 (ref)			
Later, longer, fewer FPP	0.65	0.01	0.000
Nationwide one child FPP	0.32	0.00	0.000
No FPP(ref)			
Han Ethnicity	0.93	0.01	0.000
Non-Han ethnicity(ref)			
Lower secondary school	0.79	0.01	0.000
Upper secondary and above	0.54	0.02	0.000
Primary school (ref)			
Rural residence	1.45	0.08	0.000
Urban residence(ref)			
Age at the previous parity	0.96	0.00	0.000
At least one son	0.74	0.01	0.000
Only daughter (ref)			
Contraceptive prevalence	0.99	0.00	0.000
Average household income	0.94	0.03	0.029
30 provinces skipped			
_cons	0.62	0.09	0.001

Source: data from 1982 survey

Table 5.11a. Estimated Relative Risk of Parity 2-3 Progression among Women Aged 15-49 (1988 survey).

	exp(b)	Std.	P>z
year1	1.57	0.08	0.000
year2	7.37	0.37	0.000
year3	9.75	0.49	0.000
year4	6.67	0.34	0.000
year5	4.46	0.23	0.000
year6	3.11	0.16	0.000
year7	2.29	0.12	0.000
year8	1.70	0.10	0.000
year9	1.16	0.07	0.022
year10 (ref)			
Later, longer, fewer FPP	0.70	0.00	0.000
Nationwide one child FPP	0.44	0.00	0.000
Differentiated one child FPP	0.29	0.01	0.000
Differentiated one and half children FPP	0.34	0.00	0.000
Differentiated two and more children FPP	0.36	0.01	0.000
No FPP(ref)			
Han Ethnicity	0.87	0.01	0.000
Non-Han ethnicity(ref)			
Lower secondary school	0.82	0.01	0.000
Upper secondary and above	0.68	0.01	0.000
Primary school (ref)			
Rural residence	1.19	0.01	0.000
Urban residence(ref)			
Age at the previous parity	0.94	0.00	0.000
At least one son	0.63	0.00	0.000
Only daughter (ref)			
Contraceptive prevalence	1.02	0.00	0.000
Average household income	0.86	0.00	0.000
30 provinces skipped			
_cons	0.08	0.01	0.000

Source: data from 1988 survey

Table 5.12a. Estimated Relative Risk of Parity 2-3 Progression among Women Aged 15-49 (1997 survey).

	exp(b)	Std.	P>z
year1	3.76	0.96	0.000
year2	10.76	2.72	0.000
year3	9.75	2.48	0.000
year4	6.21	1.60	0.000
year5	3.47	0.92	0.000
year6	2.45	0.67	0.001
year7	2.43	0.68	0.002
year8	1.57	0.47	0.135
year9	1.26	0.41	0.468
year10 (ref)			
Later, longer, fewer FPP	1.17	0.13	0.167
Nationwide one child FPP	0.89	0.10	0.316
Differentiated one child FPP	0.74	0.12	0.052
Differentiated one and half children FPP	0.77	0.10	0.038
Differentiated two and more children FPP	0.76	0.14	0.145
No FPP(ref)			
Han Ethnicity	0.85	0.06	0.027
Non-Han ethnicity(ref)			
Lower secondary school	0.78	0.05	0.000
Upper secondary and above	0.59	0.07	0.000
Primary school (ref)			
Rural residence	1.35	0.12	0.001
Urban residence(ref)			
Age at the previous parity	0.93	0.01	0.000
At least one son	0.41	0.02	0.000
Only daughter (ref)			
Contraceptive prevalence	0.99	0.00	0.029
Average household income	0.94	0.01	0.000
30 provinces skipped			
_cons	0.50	0.28	0.220

Source: data from 1997 survey

Table 5.13a. Estimated Relative Risk of Parity 2-3 Progression among Women Aged 15-49 (2001 survey).

	exp(b)	Std.	P>z
year1	7.99	1.69	0.000
year2	20.35	4.28	0.000
year3	16.41	3.46	0.000
year4	10.42	2.22	0.000
year5	6.78	1.47	0.000
year6	3.67	0.82	0.000
year7	3.57	0.81	0.000
year8	2.11	0.51	0.002
year9	1.56	0.41	0.087
year10 (ref)			
Nationwide one child FPP	1.09	0.06	0.135
Differentiated one child FPP	1.18	0.11	0.070
Differentiated one and half children FPP	1.09	0.07	0.176
Differentiated two and more children FPP	1.11	0.12	0.333
Later, longer, fewer FPP (ref)			
Han Ethnicity	0.99	0.05	0.764
Non-Han ethnicity(ref)			
Lower secondary school	0.72	0.03	0.000
Upper secondary and above	0.68	0.05	0.000
Primary school (ref)			
Rural residence	1.40	0.10	0.000
Urban residence(ref)			
Age at the previous parity	0.92	0.00	0.000
At least one son	0.32	0.01	0.000
Only daughter (ref)			
Contraceptive prevalence	0.98	0.00	0.000
Average household income	0.95	0.00	0.000
30 provinces skipped			
_cons	0.38	0.15	0.018

Source: data from 2001 survey

Table 5.14a. Estimated Relative Risk of Parity 2-3 Progression among Women Aged 15-49 (2006 survey).

	exp(b)	Std.	P>z
year1	10.03	2.47	0.000
year2	21.48	5.27	0.000
year3	14.28	3.52	0.000
year4	9.52	2.37	0.000
year5	6.36	1.61	0.000
year6	4.11	1.07	0.000
year7	2.89	0.78	0.000
year8	1.86	0.54	0.032
year9	1.76	0.53	0.058
year10 (ref)			
Differentiate one child FPP	0.70	0.08	0.002
Differentiate one and half children FPP	1.20	0.09	0.018
Differentiate two and more children FPP	1.18	0.16	0.226
Nationwide one child FPP (ref)			
Han Ethnicity	1.08	0.06	0.226
Non-Han ethnicity(ref)			
Lower secondary school	0.73	0.03	0.000
Upper secondary and above	0.71	0.06	0.000
Primary school (ref)			
Rural residence	0.75	0.05	0.000
Urban residence(ref)			
Age at the previous parity	0.93	0.01	0.000
At least one son	0.27	0.01	0.000
Only daughter (ref)			
Contraceptive prevalence	0.98	0.00	0.000
Average household income	0.97	0.00	0.000
30 provinces skipped			
_cons	0.44	0.24	0.135

Source: data from 2006 survey

CHAPTER SIX

TRENDS AND DETERMINANTS OF CONTRACEPTIVE METHOD CHOICE IN CHINA

ABSTRACT

CONTEXT: Contraception promotion is a crucial component of family planning policy in China. Long-acting methods, particularly IUD and sterilization, have been consistently advocated by the government. However, the strategy has been gradually shifted from largely relying on mass mobilization and administrative means to more client-centred informed choice since mid- 1990s.

METHODS: Data for the analysis are drawn from six national population and family planning surveys conducted during 1982-2006. Data from all six surveys are used for describing the trends in contraception use and method mix change over the last 3 decades. Individual level data from the 2001 and 2006 surveys are applied to investigate the effect of changing strategies on parity-specific methods uptake. Both individual and community level data from the 2006 survey are then used to examine the determinants of informed choice. Separate logistic multilevel models are fitted for each of the two outcomes.

RESULTS: The contraceptive prevalence rate among married women of reproductive age in China was over 70 percent in 1980s and reached 80 percent since 1990s. In terms of method mix, sterilization and IUD accounted for over 60 percent in 1980s, and peaked above 80 percent after the 1990s. There was then a shift towards increased condom use and a decrease in sterilization among 'new users' between 1996-2001 and 2001-2006. Multilevel analysis shows significant reductions in the uptake of methods emphasized by government policy between 1996-2001 and 2001-2006. But highly significant province-level and county-level effects suggest the continuation of a strong

exogenous influence on women's choice. Contextual analysis shows that community contraception provision plays a positive role for informed choice.

CONCLUSIONS: Although the historical top-down approach towards promoting long-acting methods has been weakening over time, the institutional pressure on individuals remains influential for the method choice. Enhancing community contraception provision and providing adequate counselling could significantly benefit informed contraceptive choice in China and in turn could contribute to improving women's reproductive health.

6.1 BACKGROUND

Contraception promotion remains a crucial component of family planning policy in China. Long-acting methods particularly IUD and sterilization have been consistently advocated by the government. However, the strategy has been gradually shifted from largely relying on mass mobilization and administrative means, enforcing parity driven prescriptions of IUD use after the first birth and sterilization after the second birth, to a more client-centred informed choice since the 1990s (NPFPC 2007; Wang 2012a, 2012b). 'Quality of Care' refocusing on clients' needs, informed choice and better quality services has been scaled up from a small scale pilot project in early 1990s into a national reform program after 2000 (Bruce 1990; Kaufman, Zhang and Xie 2006).

Sizable evidence has been found that broadening the choice of contraceptive methods increases overall contraceptive prevalence (Philips et al. 1988; Jain 1989; Ross et al. 2002; Magadi and Curtis 2003). The provision of a wide range of contraceptive methods increases the opportunity for individual couples to obtain a method that suits their needs. Strong community-level influences on contraceptive service use has been found in different studies in countries such as India, Morocco and Bangladesh (Stephenson and Tsui 2002; Khan and Shaw 2011). Researchers also found that women's social, economic and demographic characteristics are associated with contraceptive method choice (Steele, Curtis and Choe 1999). In China, studies show that sterilization and IUD are the main methods married women used during the period of 1988-2001. Higher educated women are more likely to choose IUD; while lower educated are more likely to choose sterilization. Women in urban areas are more likely to choose IUD and condom, while those in rural areas are more likely to choose sterilization (Wang 2012b; Ren and Zheng 2006). A formal evaluation of the impact of the 'Quality of Care' intervention in 30 pilot counties found that between 2003 and 2005, there were reductions in the prevalence of methods emphasized by official policy, but family planning workers continued to influence women's choices (Brown, Li and Padmadas 2010).

To date, there has been a notable lack of systematic national level analysis evaluating the impact of the change in the formal FPP strategy regarding method mix on women's contraceptive behaviour in China. Of the limited studies that have been conducted, some could not distinguish the timing of method being chosen and thus failed to capture the behaviour change precisely (Ren and Zheng 2006; Wang 2012b). Others failed to explore the unobserved contextual effects (Reng et al. 2003; Zhang 2007). This study, therefore, aims to contribute to the literature on contraceptive method choice in China by addressing this gap. The paper aims to i) provide robust evidence of the change in method mix over time; ii) examine the effects of new client centred strategies on method mix, in particular focussing on changes in the uptake of methods advocated by policy; and iii) explore the determinants of contraceptive choice, including an assessment of the importance of contextual factors in that choice. Our primary hypothesis is that the provision of informed contraceptive choices in China has improved nationwide since late 1990s.

6.2 DATA AND METHOD

This section describes the data source, analytical approach, and measurements considered in the study.

Data

Data for the analysis are draw from six national population and family planning surveys 1982-2006. The quality of this set of data has systematically assessed as being of high quality and consistent in Chapter three. However, the questions in each survey are not exactly the same. For instance, a question concerning the start of the current episode of contraceptive method use appears only in 2001 and 2006 surveys. Data on both

individual and community level information for the whole country is available only in the 2006 survey.

In order to address the first objective, all six surveys were used to provide a descriptive overview of trends in contraceptive use and the changes in method mix. For the second objective, individual data from the 2001 and 2006 surveys were used to investigate the extent to which the uptake of parity-specific methods among women were influenced by the family planning programme. For the third objective, both individual and community level data from the 2006 survey were used to examine the factors including community variables influence the informed contraceptive method choice.

Sample selection

To describe the changes in method mix overtime, all currently married women aged 15-49 are selected from the 1982, 1988, 1992, 1997, 2001 and 2006 surveys.

To examine the changes in policy-promoted parity-specific methods choice, the analysis considered 32,409 currently married women out of a total of 39,508 women from the 2001 survey. Of these, 28,171 women were current users of contraception at the time of the survey. To capture the change of method choices, the sample was then further limited to only those new users who had commenced using a method between June 1996 and July 2001 (the 5-year period just before the survey). Women with no children (276 women) were excluded since they are not usually targeted by the family planning policy and because they are less likely to be using long-term methods. This provided a final analysis sample of 9,492 new users in total - with 5,960 at parity one and the remainder at parity two or higher.

A similar data selection procedure was then applied to the 2006 survey. For the analysis, 28,582 currently married women were selected from a total of 33,257 women. Of these, 24,176 were current users of contraception at the time of the survey. Only 7,611 women who had started using a method between August 2001 and September 2006 (the 5-year period just before the survey) were considered for the analysis. Again, women with no children (229 women) were excluded. This selection procedure yielded a data-set of 7,382 new users, with 4,683 at parity one and the rest at parity two or higher.

For the third objective, i.e. the investigation of the determinants of informed contraceptive method choice, community data from the 2006 survey was merged with the individual dataset which included a sample of 7,611 currently married women who were current users of contraception and who had started using a method in the 5-year period just before the survey (including those women with no children). Among which, 243 cases with missing value of community variable were excluded. This selection procedure yielded a dataset of 7,368 new users.

Analytical approach

Objective (i) involved simple descriptive analysis. For objectives (ii) and (iii) separate logistic multilevel models were fitted for each of the two outcomes: (a) whether the woman used the method traditionally promoted by the family planning policy for her parity, vs. other methods; and (b) whether the woman used the method with informed choice vs. without informed choice. The reasons for using a multilevel model are twofold. First, the data used for the analysis have a hierarchical structure, with women being selected from the household within each community, which in turn have been selected from the county and then from the province. Second, China's Family Planning Program is managed as a top-down process. Thus there are several levels of influence for the woman's choice of contraception. One study using Bangladesh Demographic and Health Survey data illustrated the tendency for the standard logistic model to

seriously bias the parameter estimates of observed covariates when analysing multilevel data (Khan and Shaw 2011). To capture the influence of the hierarchical structure of family planning services delivery, a multilevel approach allowed integrating variables measured at different levels with unobserved exogenous effects.

The models take the form of four-level models with women (level 1) nested within communities (level 2), nested within counties (level 3) and nested within provinces (level 4). The first model is written:

$$\text{logit}(P_{ijkm})=\beta_0 + \beta_t t_{ijkm}+ \beta_1 X_{1ijkm}+\dots \beta_p X_{pijkm} + \delta_1 Z_{jkm}+ \delta_2 Z_{km}+ \delta_3 Z_m +u_{0jkm}+ v_{0km}+w_{0m} \quad (1)$$

where subscript i, j, k, m refers to level 1, level 2, level 3 and level 4 respectively, t_{ijkm} is a dummy variable that distinguishes two time periods, x variables refer to woman's characteristics, z variables capture the context effect at each level, with u, v, and w normally distributed random effects capturing the exogenous unobserved factors at each level. The outcome of principal interest was the random effect W_{0m} and its associated variance σ_m^2as a measure of the influence of the family planning policy on method choices. This effect was expected to be crucial taking into account the way in which family planning programmes operate in China. However, it was anticipated to weaken over time with the move towards an informed-choices approach. This changing influence was investigated by allowing σ_m^2 to be different for the two time periods – introducing a covariance term for the second time period.

First of all, separate models applying 2001 survey or 2006 survey data were fitted by parity, with the outcome being the method traditionally promoted by the family planning policy for her parity i.e. IUD use at parity one and sterilization at higher parities. Initial analysis showed some of the main effects to be similar; the models were combined with the inclusion of appropriate interactions. The fixed-effect model was then extended to incorporate the hierarchical structure of the data: women within communities within counties within provinces.

The second model is written:

$$\text{logit}(P_{ijkm})=\beta_0 + \beta_1 X_{1ijkm}+\dots \beta_p X_{pijkm} + \delta_1 Z_{jkm}+ \delta_2 Z_{km}+ \delta_3 Z_m +u_{0jkm}+ v_{0km}+W_{0m} \quad (2)$$

Since only one survey is used for this stage of the analysis, there is no time dummy variable. The rest of items are the same as the Model (1).

After fitting the models, the assumptions about random effects for both sets of multilevel logistic models were evaluated using normal probability plots for the individual, community, county and province level residuals. Statistic software MLwiN 2.32 is used for the multilevel modelling (Rasbash et al. 2009).

Measurements

Outcome variable of Model (1): for the parity-one women, a response variable was created that contrasted IUD use with use of all other reversible methods and at parity two or higher, a response variable was created that contrasted the use of sterilization with the use of all other methods.

Outcome variable of Model (2) is whether the woman experienced an informed choice of contraception, contrasted with no informed choice. Informed choice of contraception is defined as those women who are currently using contraceptive where the decision regarding the choice of that method is being reported as being made by themselves or as part of a couple and who were aware of the side effect of the contraceptive. On the contrary, women had no informed choice either if the decision regarding the choice of contraceptive choice was reported as being made by a family planning worker or by

others rather than the woman or couple, or if the woman did not understand the potential side effects of their current contraceptive use.

The explanatory variables are based on existing research, as described previously. Model (1) includes demographic characteristics (age, parity, year of marriage) and socio-economic characteristics (education, ethnicity, rural-urban residence, and region) of the woman. A dummy variable was included to distinguish between the two time periods covered by the surveys in order to measure the overall change across time. The province level in the multilevel analysis was of interest because the family planning policy was regulated at this level throughout China. Model (2) includes not only demographic and socio-economic characteristics of the woman, but also a community level variable concerning contraception provision. This was measured based on a score variable constructed from six questions regards six types of contraception provision (condom, diaphragms, three types of oral pills and emergency pill) in the community. The response options were yes or no. A score of 1 was given to the 'yes' response and of 0 to the 'no' response to each question. Then the scores for the six questions are summed and recoded to 1 if the sum is lower than 3 reflecting a relatively limited method mix in contraception provision, and recoded 2 if higher than 3 reflecting relatively more varied contraception provision.

6.3 RESULTS

6.3.1 Trends in contraceptive prevalence and method choice 1982-2006

Figure 6.1 shows the trends in contraceptive use by method among currently married women of reproductive age women in China from 1982 to 2006. Overall, contraceptive use among married women was high which increased from 71% in 1982 to over 80% after 1990s. The proportion of married women 'choosing' sterilization increased from 35% in 1982 to 54% in 1992, and then steadily declined to 39% in 2006. In contrast to

sterilization, the use of IUD steadily decreased from 50% in 1982 to 40% in 1992, and then increased to 48% in 2006. Interestingly, the proportion of women using the oral pill declined over time, from 8% in 1982 to just 1% in 2006; whilst condom use increased from 2% in 1982 to 10% in 2006. These method-specific trends show that the method mix in China has been dominated by sterilization and IUD. However sterilization has become less common in the most recent two decades, with the dominance of IUD use. Moreover, there has been a shift from oral pill to condom use.

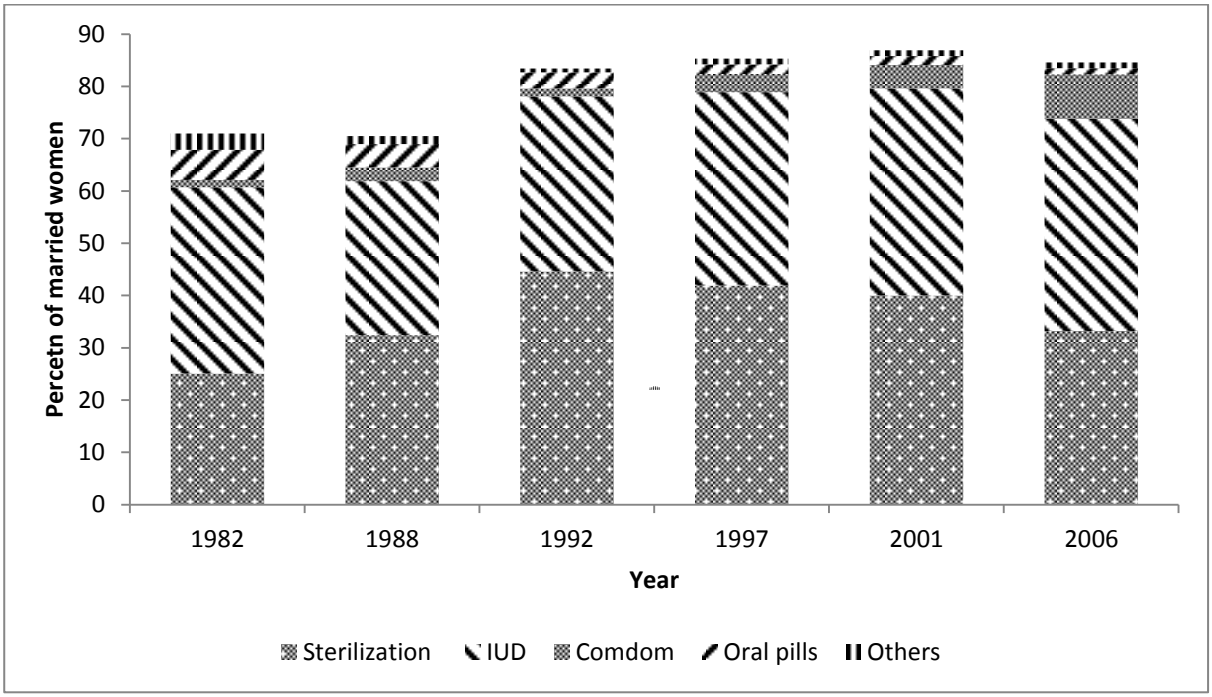


Figure 6.1. Trends in Contraceptive Method Choice (current use) among Married Women Aged 15-49, by Survey Year, China 1982-2006.

Table 6.1 provides evidence that over time, the family planning program in China extended the contraceptive options available to a substantial proportion among each subpopulation (typology defined in section 4.2), reflecting that the implementation of FPP depends on the masses use of contraceptive measures.

Table 6.1. Contraceptive Prevalence Rate among Married Women Aged 15-49 by Sub-Population, 1982-2006

Sub-population	1982	1988	1992	1997	2001	2006
I	76.0	77.3	84.0	82.4	87.3	85.0
II	80.2	77.9	85.9	85.2	87.9	84.1
III	69.9	70.8	84.1	85.3	87.4	84.9
IV	38.7	50.4	67.9	68.8	75.9	80.1

Calculated from 1982, 1988, 1992, 1997, 2001 and 2006 surveys

6.3.2 Factors associated with the use of policy promoted methods

Over the past two decades, there has been a clear shift in the use of contraceptive methods away from those traditionally encouraged by the family planning policy towards condom use at parity one and IUD use at parity two (Table 6.2). The percentage distribution of new users adopting methods formally promoted by the FPP (IUD use at parity one or sterilization at higher parities) by selected variables between 1996-2001 and 2001-2006 is shown in Table 6.3. The unadjusted figures show that there is a 13 per cent reduction in the choice of policy-driven methods between 1996-2001 and 2001-2006 (from 76.4% to 63.5%). The influence of family planning workers favoured by traditional policy still persists (Table 6.3). There is however evidence that more couples are making their own choices of contraceptives. Amongst those using a policy driven method (IUD at parity 1 or sterilisation at parity 2), the percentage of women reporting that their choice was influenced by the family planning worker falls by 21 per cent between 1996-2001 and 2001-2006 (Figure 6.2).

Older women are less likely to use policy-driven methods (Table 6.3). However, it has to be noted that since the analysis is restricted to those who commenced use in the 5 years before the survey, the older women are by definition a select group in that they have not chosen a permanent method in the past. Similar patterns are noted for the distribution by year of marriage. The reduction in the use of policy promoted methods is greater among women living in rural areas. Better educated women are less likely to use

policy promoted methods than their lower educated counterparts, with the percentage of new users with upper middle school education and above education choosing such methods falling to just over half (52.1%) in 2001-2006.

Table 6.2 Choice of Contraceptive Method among New Users by Parity (%), China 1996-2001 and 2001-2006.

Method	1996-2001 (n=9492)			2001-2006 (n=7382)		
	Overall	Parity one	Parity two or higher	Overall	Parity one	Parity two or higher
IUD	58.2	80.7	24.0	52.5	66.9	31.3
Sterilization (women)	21.7	1.1	58.0	18.6	0.6	51.3
Sterilization (men)	4.1	0.1	11.2	2.2	0.1	6.1
Condom	10.4	12.3	2.7	36.7	27.4	7.3
Oral pill	3.4	3.8	2.1	3.0	2.8	1.9
Other	2.1	2.0	2.1	2.1	2.2	2.1
Total women	9492	5960	3532	7382	4683	2699

Data source: 2001 and 2006 surveys

Figure 6.2 Source of Motivation for Current Contraceptive Method among New Users, China 1996-2001 and 2001-2006. Data source: 2001 and 2006 surveys

Table 6.3 Percentage of New Users Adopting Policy-Promoted Methods[4] by Selected Variables, China 1996-2001 and 2001-2006.

Variables	1996-2001		2001-2006	
	Per cent	No. of women	Per cent	No. of women
All	**76.4**	**9492**	**63.5**	**7382**
Motivator for current method				
Woman	71.0	4061	61.4	3070
Couple	62.8	1260	59.9	2989
Family planning worker	89.5	3235	83.0	984
Other (including health professionals)	72.6	936	57.2	339
Current age (in years)				
15-24	85.4	1110	70.5	1017
25-34	78.9	6765	66.7	4659
35-49	59.2	1617	50.5	1706
Year of marriage				
Pre-1994	69.6	5189	50.4	1860
1995-1999	84.7	4081	64.2	2025
Post-1999	78.8	222	70.0	3497
Parity				
1	80.7	5960	66.9	4683
2+	69.1	3532	57.4	2699
Woman's education				
Primary or less	78.4	4081	68.8	2145
Lower middle school	78.9	3911	65.5	3566
Upper middle school and above	64.0	1500	52.1	1671
Woman's ethnicity				
Han	78.1	8468	64.1	6475
Non-Han	62.2	1024	58.7	907
Residence				
Urban	63.8	2331	55.3	2419
Rural	80.4	7161	44.7	4963
Region				
Eastern	76.9	3649	59.2	3071
Central	81.7	2902	72.2	2309
Western	70.3	2941	59.9	2002

Data source: 2001 and 2006 surveys

[4] Refers to IUD use at parity one or sterilization at higher parities

Regression analysis (Table 6.4) shows the effect of the explanatory variables from the multilevel logistic model predicting whether or not a woman's current choice of method is the one traditionally promoted by the family planning policy for her parity. The null model (without any covariate) is estimated first. The residual variance of the level-2, level-3 and level-4 were significant, indicating the need for multilevel modelling. The odds of a woman choosing a policy promoted method changes significantly over time as shown by the odds ratio of 0.60 for new users choosing such method in the five years prior to 2006 relative to those choosing method in the five years prior to 2001. The variance parameters for the variables analysed are also shown in Table 6.4. The random-effect variances are significant at the community, county and province levels. Usually, variances decrease at higher levels when these represent nested levels of geographic clustering. However, the results show that in this case the province-level variance is the largest, while the covariance term at the province level is not significant, suggesting that there is no evidence of any change in the random-effect distribution between the two time periods. The estimated variance at the province level is 0.61, and about 67 per cent of the province random effects lie between -0.44 to +0.44 (one standard deviation). This generates odds ratios of between 0.65 and 1.55, showing unexplained variation at the province level which is not unexpected given the top-down nature of the Chinese family planning programme.

The estimated odds ratios (based on interaction terms, see Table 6.4) of using a policy-driven method from different motivators by parity among Han and non-Han ethnic groups are shown in the Appendix Table 6.1a. At parity one, the odds of using a policy-driven method are higher for women whose decisions are influenced by the family planning worker than for women making choices on their own. On the other hand, if women's decisions are made jointly with husbands or influenced by others, including health professionals, then the odds of using a policy-driven method are significantly lower when compared to women making decisions on their own. The association between the motivator for the method and use changes with parity and ethnic groups. In general, the policy-promoted method is less popular at higher parities, as shown by the

odds ratio of 0.12 for the women of parity two or higher using sterilization relative to women of parity one using IUD. Regardless of who influences the method choices, non-Han ethnic group have higher odds of IUD use after parity one but lower odds of sterilization after parity two than that of Han group. Those married most recently are more likely to choose the policy-driven method than their counterparts. The effect of woman's education is in the expected direction: women with lower levels of education are more likely to use policy-driven methods. Women living in rural areas are also more likely to choose the policy-driven method than those in urban areas.

Table 6.4 Odds of Using a Policy-Driven Method[5] with Unadjusted Percentages in China 1996-2001 and 2001-2006 (results of four level logistic regression) (n=16874)

Variables	**Odds ratio [95 per cent CI]**	**Unadjusted percentage (n)**
Fixed effects		
Survey		
2001	1.00	76.4 (9492)
2006	0.60 [0.38, 0.94]*	63.5 (7382)
Motivator for current method		
Woman	1.00	66.8 (7131)
Couple	0.40 [0.35, 0.46]***	60.7 (4249)
Family planning worker	1.92 [1.57, 2.33]***	88.0 (4219)
Other (including health professionals)	0.55 [0.46, 0.66]***	68.6 (1275)
Current age (in years)		
15-24	1.00	78.3 (2127)
25-34	1.23 [1.05, 1.44]**	74.0 (11424)
35-49	0.77 [0.63, 0.94]**	54.8 (3323)
Year of marriage		
Pre-1994	1.00	64.6 (7049)
1995-1999	1.32 [1.18, 1.49]***	77.9 (6106)
Post-1999	1.30 [1.09, 1.55]**	70.5 (3719)
Parity		
1	1.00	74.6 (10643)
2+	0.12 [0.10, 0.14]***	64.1 (6231)
Woman's education		
Primary or less	1.00	75.2 (6226)
Lower middle school	0.89 [0.77, 1.02]	72.5 (7477)
Upper middle school and above	0.60 [0.48, 0.74]***	57.7 (3171)
Woman's ethnicity		
Han	1.00	72.0 (14943)
Non-Han	1.40 [1.11, 1.78]**	60.7 (1931)
Residence		
Urban	1.00	59.5 (4750)
Rural	2.10 [1.86, 2.36]***	75.1 (12124)
Region		
Eastern	1.00	68.8 (6720)
Central	1.77 [1.00, 3.12]*	77.5 (5211)
Western	1.35 [0.80, 2.29]	66.3 (4943)
Interactions		
Parity2+*Non-Han	0.32 [0.24, 0.42]***	44.5 (1010)
Parity2+*Couple	6.82 [5.50, 8.46]***	64.6 (1613)
Parity2+*FP worker	3.42 [2.60, 4.50]***	84.3 (2095)
Parity2+*Other	4.06 [2.85, 5.77]***	63.8 (414)
Random effects	**Null model without covariates**	**Model with covariates**
Province level variance and standard error	0.93 (0.21)***	0.61 (0.19) ***
Covariance and standard error		-0.03 (0.14)
County level variance and standard error	0.64 (0.08)***	0.57 (0.07) ***
Community variance and standard error	0.42 (0.04)***	0.40 (0.05) ***

Data source: 2001 and 2006 surveys

[5] Refers to IUD use at parity one or sterilization at higher parities.
CI: Confidence Interval; ***p<0.001; **p<0.01; *p<0.05

6.3.3 Determinants of informed method choice

The parameter estimates from the multilevel multivariate model of the determinants of informed method choice are presented in Table 6.5. The null model is estimated first. The residual variance of the level-2 and level-3 were significant. The analysis shows that after controlling for women's individual characteristics, the degree of variation in contraception provision available in the community plays important role. The odds of making an informed choice of contraception amongst women living in a community where more than three types of contraception are available is 1.5 times of those living in a community with availability of only a limited method mix. Method itself also influences the likelihood of informed choice. Compared with IUD, new users currently using a condom have significantly higher odds of informed choice, while those with sterilization have (perhaps not surprisingly) a lower odds of informed choice. The effects of other individual characteristics are as expected. Women with higher education have higher odds of informed choice than those with lower education. Rural residents have lower odds than their urban counterparts. Women living in China's central region have the lowest odds of informed choice of contraception compared with those living in the eastern and western regions. In contrast to the results in model 1, it is found that community level variance is greater than the county level and province level (Table 6.5), highlighting the importance of local implementation for informed choice.

The assumptions about random effects were validated for the both multilevel logistic model 1 and model 2, using normal probability plots for the individual, community, county and province level residuals. The results confirmed the normality assumption (Appendix Figure 6.1a, 6.2a).

Table 6.5 Odds of Informed Choice of Contraception [6] (results of four level logistic regression) (n=7368)

Variables	OR (95 per cent CI)	Unadjusted percentage (n)
Fixed effects		
Current age		
15-24 (ref)	1.00	61.6 (1052)
25-34	1.22[1.02, 1.44]*	62.4 (4644)
35-49	1.15[0.93, 1.41]	58.9 (1672)
Ethnicity		
Han (ref)	1.00	60.6 (6454)
Non-Han	1.20[0.91, 1.58]	68.1 (914)
Education		
Primary or less (ref)	1.00	48.0 (2141)
Lower middle school	1.64[1.42, 1.89]***	62.1 (3565)
Upper middle school and above	3.00[2.42, 3.71]***	77.4 (1667)
Residence		
Urban (ref)	1.00	70.4 (2352)
Rural	0.97[0.78, 1.21]*	57.3 (5016)
Region		
Eastern (ref)	1.00	67.0 (3085)
Central	0.55[0.38, 0.78]***	53.6 (2273)
Western	0.71[0.49, 1.04]	61.9 (2010)
Contraception		
IUD（ref）	1.00	62.2 (3878)
Male/female sterilization	0.64[0.54, 0.76]***	44.3 (1570)
Condom	1.57[1.33, 1.85]***	74.5 (1574)
Others	1.45[1.08, 1.94]*	71.7 (346)
Types of methods community provided		
Less than 3 (ref)	1.00	53.4 (1866)
More than 3	1.48[1.19, 1.85]***	64.2 (5502)
Random effects	**Null model without covariates**	**Model with covariates**
Province level variance and standard error	0.16 (0.1)	0.02 (0.04)
County level variance and standard error	0.62 (0.13) ***	0.36 (0.09)***
Community variance and standard error	1.05 (0.09) ***	1.01 (0.09)***

Data source: 2006 survey

[6] Refers to woman had the informed choice of contraception, contrasted with no informed choice
CI: Confidence Interval; ***p<0.001; **p<0.01; *p<0.05

6.4 DISCUSSION

This analysis has found that contraceptive prevalence among married women of reproductive age increased from a high level of 70% in the 1980s to an even higher level of 80% after the 1990s. The prevalence rate in China is much higher than that of other developing regions–66% in Asia, 73% in Latin America and the Caribbean, and only 22% in Sub-Saharan Africa in 2000–2005 (Seiber, Bertrand and Sullivan 2007). The high contraception prevalence can be explained by a top-down mandated birth-control policy, under which almost every woman of reproductive age has need of contraception at a certain life stage. Our results also demonstrate that sterilization and IUD remain the most popular method in China over time, though sterilization is slightly less prevalent after the 1990s. The overall proportions of users relying on female sterilization and IUD are around 42% and 20% in Asia in 2000–2005 (Seiber, Bertrand and Sullivan 2007); the corresponding figures in China are 39% and 48% respectively. In addition, there is a steady increase of condom use in China. Understanding shifts in contraceptive method choice is important to help policymakers and program managers meet current contraceptive demand and future needs.

The results show that among 'new users', between the study periods 1996-2001 and 2001-2006, there has been an increase in condom use after the first birth and in IUD use after the second birth, both of which represent a move away from the methods traditionally being promoted under China's FPP at these parities. The odds of women using a policy-driven method fell significantly between the two study periods, even after controlling for parity, age, year of marriage, motivator of current method use, and other social variables. This suggests that the national reform program of 'Quality of Care' was generally successful in weakening the top-down policy of enforcing specific methods by promoting a shift towards client-centred family planning services based on the principle of enabling users to make an informed choice of method. This is also supported by the evidence that more women and couples are choosing the method motivated by themselves, rather than by family planning workers; and more women

understand the characteristics of the method which imply that women are benefitting from method counselling. However, the significant province and county level variation suggests the possible continuation of the rigid top-down approach in family planning system. There is no statistical evidence of any change in this respect between the two time periods. The individual-level results support the evidence that family planning workers still have some influence in promoting the use of policy-driven methods. Meanwhile, parity and ethnicity have interacting effect on policy-driven method use. Sterilization after parity two is less popular than IUD after parity one, particular among non-Han ethnic group. This might be because of culture barriers associated with sterilization use and lack of adequate method counselling (Wang 2012b). These results are highly consistent with a previous study (Brown, Li and Padmadas 2010), which indicated that the reforms of the family planning program that occurred in the limited number of pilot counties have also been replicated nationwide. Following the principle of ICPD in Cairo in 1994 and the Bruce framework of quality of care (Bruce 1990), contraception services in China began to refocus on clients' needs, informed choice and better quality services. The pilot program of Quality of Care in family planning services in China started in the early 1990s. The initial small scale pilot project has since been scaled up into a national reform program in 2000s (Kaufman, Zhang and Xie 2006). The reform activities included expanding the range of contraceptive methods available and enabling individuals and couples to make informed decisions about which method to use without any form of coercion and discrimination by the authorities. Our results support the primary hypothesis that the provision of informed contraceptive choices has improved nationwide since late 1990s.

Furthermore, our analysis highlights that contraception provision and local method mix also plays an important role for informed choice. Women living in those communities with a wider choice of methods have higher odds of informed choice than those living in the community with less varied method provision, after controlling for women's individual characteristics. A wider variety of contraception provision might also link to greater exposure to family planning information, counselling and interpersonal communication, which help to inform clients about the range of contraceptives available

to them and enable them to make an informed and voluntary choice of the method they wish to use (Philips et al 1988; Liu 2004; Wu 2008b). Interestingly, in comparison with those using an IUD, women who had sterilization have a lower odds of having made an informed choice. The explanation may be that sterilization is likely to be motivated by family planning workers; and the side effect of surgery itself may be more difficult to understand without adequate counselling. Women living in the central region have the lowest odds of informed choice of contraception compared with those in eastern and western region. At the time of the study, the central provinces were subject to the 'one and half child family planning policy' under which those women whose first child is a girl were permitted a second child. This region historically had a strong emphasis on post-partum IUD use after the first birth followed by sterilization after subsequent births. The results therefore highlight the need for further programme and policy interventions, such as enhanced method choice counselling and that more work needs to be done within the central provinces.

Promoting access to contraceptives has been acknowledged to be effective on fertility decline and achieving sexual and reproductive health in developing countries (Tsui and Bogue 1978; Hardee, Xie and Gu 2004; Bongaarts and Sinding 2011; World Health Organization (WHO) 2014). The principles of informed and voluntary decision making are not new. It requires service options to be available; the decision-making process to be voluntary; individuals to have access to appropriate information; good client-provider interaction including counselling ensured; and the social and political context to be in place to support autonomous decision making (WHO 2014). Over the last 20 years, much progress has been made in China in building a consensus for the principles of individual choice in family planning, and large investments have been made to develop counselling training and services. However despite considerable advances in support of informed and voluntary decision making in contraception choices, a wide gap still exists. Because contraceptives are provided free of charge, financial cost plays no part in determining an individual's choice of method. Barriers to informed and voluntary decision making persist for many reproductive health care clients as a result of local regulations, service-delivery practices, resource constraints (inadequate

counselling), and service providers' attitudes (Wu 2008a; Kaufman, Zhang and Xie 2006). The component of informed choice of sexual and reproductive health should include the right to decide whether and when to have children, and how many; rights to information about and access to a range of sexual and reproductive health services (United Nations Population Fund (UNFPA) 1996). If women are empowered and people's needs for sexual and reproductive health are met, population stabilization will be achieved by virtue of choice and opportunity, not coercion and control. China needs to further step up.

The present study is the first of its kind in China applying national representative data to assess the effect of national reform program of quality of care. However, given the cross sectional characteristics of the data set, I could not precisely compare women with intervention and those without intervention. Instead, I could only roughly divide women into two times period where the scaled intervention occurred in the second time period. Future research should consider using panel data to compare interventions and non-interventions to examine such influences.

Appendix

Estimated residuals, at individual, community, county and province level are used to check model assumptions. One such assumption is that the residuals at each level follow Normal distributions. This assumption is checked using a Normal probability plot, in which the ranked residuals are plotted against corresponding points on a Normal distribution curve. If the Normality assumption is valid, the points on a Normal plot should lie approximately on a straight line (Rasbash et al. 2009). The normal probability plots for the individual, community, county and province level residuals show that the assumptions about random effects were validated for the both multilevel logistic models.

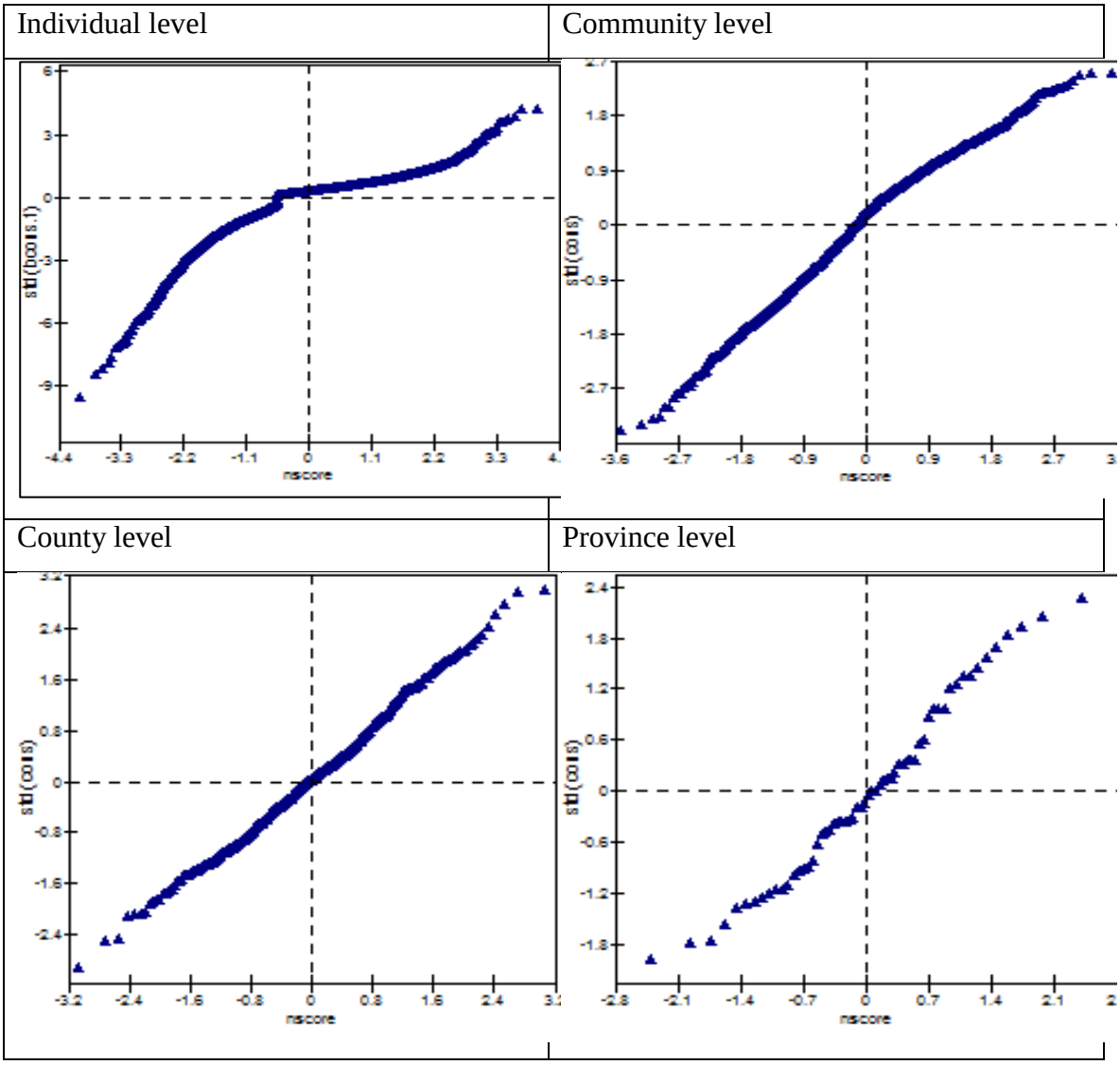


Figure 6.1a. Normal Probability Plots (Multilevel logistic model 1).

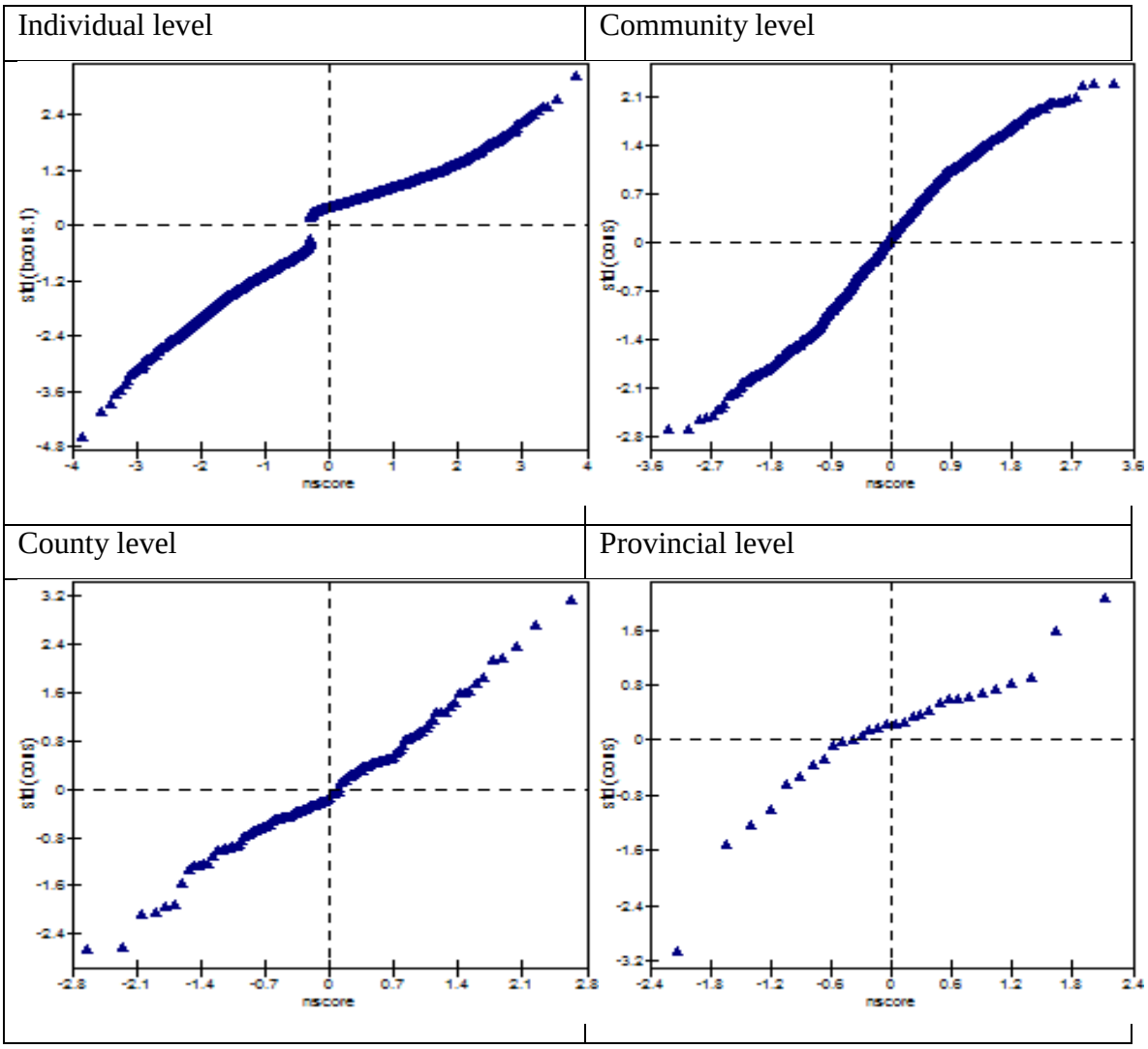


Figure 6.2a. Normal Probability Plots (Multilevel logistic model 2).

Table 6.1a. Odds Ratios of Using a Policy-Driven Method from Different Motivators by Parity among Han and Non-Han Ethnic Groups

	Han				Non-Han			
	Woman	Couple	FP worker	Other	Woman	Couple	FP worker	Other
Parity1	1.00 (reference)	0.40	1.92	0.55	1.40	0.57	2.69	0.78
Parity2	0.12	0.33	0.79	0.27	0.05	0.15	0.35	0.12

Source: derived from Table 6.4.

CHAPTER SEVEN

DISCUSSION AND CONCLUSION

The overall aim of this thesis was to investigate the evolution of family planning policy processes in China and their impact on contraceptive use and reproductive behaviour. The specific objectives were to:

- Investigate the effect of family planning policy and its associated socio-economic factors on fertility transition process in China.
- Examine the extent of the impact of family planning policies and associated educational differentials on women's fertility behaviour over time.
- Investigate whether the shift towards informed choices has had any positive impact on women's contraceptive behaviour.

This chapter presents the main findings of this study, followed by a broad discussion and conclusions.

7.1 SUMMARY OF THE MAIN FINDINGS

7.1.1 Evolution of Family Planning Policies and Fertility in China 1971-2005

Chapter four focus on the evolution of family planning policy and its impact on fertility change in China. Cross-sectional birth history data from six consecutive rounds of nationally representative population and family planning surveys from early 1970s till mid-2000 are used covering all geographical regions of China. Four sub-populations exposed to differential FPP regimes are identified. Period parity progression based

measures of fertility–TFRppr and parity progression ratios of total population and subpopulations are examined.

The analysis of fertility trends and differentials by FPP shows that fertility in China declined dramatically in 1970s, reached replacement level in early 1990s and decreased continually but slowly afterwards to well below replacement in the most recent two decades. The declines in parity progressions over time provide compelling evidence of FPP as the potential trigger of fertility decline across China. The results of fertility decomposition during different FPP period are broadly consistent with the expected impact of FPP during different period of time. Furthermore, the fertility differentials explained by the policy remain convincing in the transitional and post-transitional stage.

The disaggregation of fertility change amongst different subpopulations indicates that social economic conditions played an important role for policy implementation. The policy was more effective amongst those who were relatively better off than their counterparts, indicating that the prevailing socioeconomic conditions facilitated the extent and speed of FPP response to reducing fertility levels across China.

The net impact of differentiated FPP on TFRppr provides the quantified evidence of FPP impact from 1984-2005, during the period when total fertility rate declined from 2.09 to 1.43. If the post-transition period starting from 1990 to 2005, assuming socio-economic development following the same trajectory among sub-populations regulated by differentiated FPP, the approximate net impact of the one child FPP in rural areas, the one and half children FPP and the two children FPP on fertility reduction was 0.47, 0.72 and 0.88 respectively, with one child FPP in urban as the control group.

7.1.2 Transition to second and third birth: role of family planning policy and women's education in China

The analysis of effect of family planning policy and women's education on second and third birth transition was discussed in Chapter five based on five successive China Population and Family Planning Survey data collected during 1982-2006. The estimates were obtained from pooled observations on birth history information. The analysis considered a discrete time complementary log-log survival model.

The descriptive results show that the surviving sequence of progressing from parity 1-2 and from parity 2-3 are consistent with what I would expect both in terms of the period in which the policies were in operation and also differentiated nature of the policies. Education had inverse relationship with both parity 1-2 and parity 2-3 transition.

Multivariate analysis examines effect of FPP and women's education, controlling for demographic and socio-economic variables and survey design variables. The results demonstrate that parity progression ratios to second and third births tend to be lower after the introduction of FPP and the differential effect of policy seems to exist even after controlling for demographic and socio-economic factors. In general, there is a negative effect of increasing women's education on parity transition.

Estimated parity progression ratios of parity 1-2 and parity 2-3 transition for each FPP regime at different level of education reveals that the FPP has differential effect on educational groups. Women with higher education are more likely to be compliant with the policy requirements than those with lower education.

7.1.3 Trends and determinants of contraceptive method choice in China

Chapter six explores the trends and determinants of contraceptive method choice in China. All six survey data is used for descriptive trend of contraception use and method mix change. Individual level data from 2001 and 2006 survey is applied to investigate the effect of shifted strategies on the parity-specific methods uptake. Both individual and community level data from 2006 survey is used to examine the determinants of the contraception informed choice. Logistic multilevel models are fitted with survey data.

The results shows that the contraceptive prevalence rate among married reproductive aged women in China was high–70 percent in 1980s and above 80 percent after 1990s; the method mix over time has been dominated by sterilization and IUD. But sterilization has been less popular in recent two decades; instead, IUD has been more popular. Moreover, there has been a shift from oral pill to condom use.

There was a clear shift in the use of contraceptive methods away from those traditionally encouraged by the family planning policy towards condom use at parity one and IUD use at parity two. However, the random-effect variances are significant at the community, county and province levels, with the largest variance at province-level; while the covariance term at the province level is not significant. The results imply that institutional intervening of policy driven method choice still exist, there is no change in the random-effect distribution between the two time periods.

The analysis of informed choice determinants shows that after controlling for women's individual characteristics, the degree of variation in contraception provision available in the community plays important role. The odds of making an informed choice of contraception amongst women living in a community where more than three types of contraception are available are 1.5 times higher than those living in a community with

availability of only a limited method mix. Method itself also influences the likelihood of informed choice. Women with higher education have higher odds of informed choice than those with lower education. Rural residents have lower odds than their urban counterparts. Women living in China's central region have the lowest odds of informed choice of contraception compared with those living in the eastern and western regions. Interestingly, community level variance is greater than the county and province levels, highlighting the importance of local implementation of informed choice family planning service delivery.

7.2 DISCUSSION AND CONCLUSION

Family planning policy in China has been initially formulated influenced coincidently by Neo-Malthusian thoughts about the links between environment, population and resources. Ideas of absolute limits to food, clothing, housing, job opportunities, public services and other resources help set an absolute threshold on population. Based on a mathematic analysis of the problem, shortcuts----limiting the number of children couple could have, were taken in order to reach social goals. Nevertheless, the most fundamental assumption of FPP formulation and implementation that population growth greatly hinders economic development has been challenged. Researchers found that the relation between population growth and development was not necessarily a negative one and the impact of population growth to be modest and contingent (World Bank 1984; Finkle and Crane 1985; NAS 1986; Kelley 1988; Grimes 1998). There is no convincing evidence in China neither (Wang, Cai and Gu 2012). Top Communist Party leaders involved in the family planning movement, succeeded to the extent that the Chinese government officially joined the movement to slow population growth. With an overall political goal set and with population size entered into the calculation of achieving that goal, the policymaking process led directly to the continued existence of the policy up to today. China's rapid growth in recent decades has brought significant environmental cost and has put a great strain on the natural resources. However, as many observers have pointed out (Simon 1981; Tyrene 2006) the problem is primarily economic and

institutional rather than a problem of the largest population base and a finite natural resource. Better resource management would help.

In general, FPP in China has managed to achieve its policy goal in terms of reducing Chinese fertility in a short period of time, as found in this study–fertility decline in China has been rapid and pervasive under FPP regimes. However, FPP has been one of the most unpopular and contested policy in China. More than thirty years mandatory implementation causes enormous cost for individuals, families and the society. Prompt reform needs to be taken.

Since 1970s, all Chinese women or Chinese families could not freely decide how many children they want and when to have. FPP started at pretty low socio-economic settings when Chinese women had much higher fertility desire than the policy demanded. Overtime, the contradiction between women's or families' fertility desire and policy demand has been consistently existed, particularly serious in large rural areas, though the gap has been getting smaller or even closed in some areas today. Under the strict FPP regime, women were subject to forced abortions and sterilizations. However, there is little social science research assessing the impact of FPP on women's physical and mental health and the policy's long-lasting social consequences of the lives of China's one-child generation and their parents.

China has below replacement level fertility rate for more than 20 years since the early 1990s. Census and sample survey data from the National Bureau of Statistics show that, in recent years, fertility rates were extremely low, in the year 2010, 2011, 2012 and 2013, the figures were 1.18, 1.04, 1.26 and 1.24, which were less than half of the world average of 2.51 during 2010-2015 (United Nations 2015). These trends have serious ramifications on population change in China, in particular the shortage of people in working ages, intensification of sex ratios and higher representation of males in younger ages and rapid long-term population ageing. These changes have dramatically increased

the pension and medical expenses. Moreover, the strict FPP accelerated the formation of nuclear family structure and small family size. Furthermore, increase in rural-urban migration to cities has negatively influenced intergenerational relations and elderly care. When family care to the old people is being undermined, institutional support and living arrangements are not yet in place in both urban and rural areas. Strict FPP and limits on the number of children also led to gender imbalance and distorted sex ratios. These changes have led to marriage squeeze and an increasing number of young men without brides. These 'bachelor' men are also at higher risk of sexual transmitted diseases and sexual crime, undermining social stability **(**Poston, Conde and DeSalvo 2011).

The FPP was designed for just one generation in order to achieve a radical economic advance under the condition of so agrarian and underdeveloped context and a large population base. Ever since the FPP was put in place, Chinese policymakers have taken cautions steps to reform the policy based on the extent of policy compliance and other concerns. For instance, following widespread dissent against one child policy in early 1980s, the CPC Central Committee and State Family Planning Commission issued Central Document 7, which allowed for second children among rural couples with 'practical difficulties', as long as the couples adhere to regulations outlined in the local plan. Most recent reform occurred in October 2015, when the government announced the rules to allow all couples to have two children.

China today is hugely different from 40 years ago when FPP was initiated, in terms of demographic and socio-economic profiles. The question now is when the FPP would be phased out and what would China's fertility be if the policy had phased out? Fertility transition in other countries may offer meaningful lessons for assessing the policy impact on population. It is found that the shifting balance of costs and benefits of children in modern industrial societies leads to declines in desired family size; and achieving the preferences through contraception and abortion leads to lower fertility (Bulatao and Lee 1983). As a result, fertility levels are inversely related to development indicators, particular those indicating improvements in health and education. The recent

experience of countries with high levels of development suggests that life expectancy near 75 years combined with literacy near 95 per cent is needed on average to approach replacement level fertility. In Chinese context, based on 2010 census, the per cent literate among adults is as high as 96 per cent; and life expectancy at birth is 74.8, with female 77.4. Various surveys show that fertility desires of Chinese people are below replacement level and practical pressures could cause actual fertility rate even below the fertility desires (Zheng et al.2009; Mao and Lu 2013). The most recent national fertility intention survey in China reported that women aspire for higher education and prefer small families (Zhuang et al. 2014). Moreover, Chinese government has put considerable efforts on family planning programmes, making wider access to family planning methods and abortion services widely accessible to achieve low levels of unwanted childbearing. As the results from this study demonstrates, had the strict FP policy been not in place at all, then with the concomitant social and economic development witnessed over the past 3 decades, the fertility increase might not be as large as is often assumed. So the argument is that even without FPP in place, China could achieve its low fertility level given the changes in socio-economic conditions and well-organized family planning programme.

Over the last few years, there has been an increasing concern and public debate about the future of FPP. Rapid economic development has gradually empowered Chinese citizens to question and participate in the decisions that affect their lives, and expect the authorities to have fairly responded to their grievances. This may prompt new directions to FPP reform addressing in particular women's reproductive rights. In the long run, it calls for radical political reforms allowing for greater public participation in policy making.

In order to respect women's reproductive rights, the emphasis of Chinese family planning program should shift from rigid demographic objectives to improving the quality of reproductive health care, expanding couple's reproductive choices, providing a wider range of choice of contraceptive methods and enhancing counselling services.

This shift in policy emphasis will empower women to make informed choices and stabilize reduced family size.

7.3 Study Limitations

The quantitative analysis is based on data from the 1982, 1988, 1992, 1997, 2001 and 2006 national population and family planning surveys. The analysis covers the whole period of FPP process and implementation and contributes to a better understanding of the evolution of family planning policy in China and its impact on reproductive behaviour and contraceptive choice at macro and micro level.

Limitations using birth history data from cross sectional surveys to measure fertility include misreporting (particular underreporting) births; censoring fertility experience of women at the time of interview; not evenly distributed age range of the women if moving backwards in time from the interview; ignorance of mortality and migration. It is difficult to estimate the extent of these limitations, but I estimate them to be small because the internal and external comparison of the fertility levels derived from the 1982, 1988, 1997, 2001 and 2006 survey data used in this study are close to results from other sources (in Chapter three).

Another concern is data pooling. By pooling means the statistical analysis of estimates on the basis of multiple data sources, not referring to the same population. The potential problems include poor model fitting in each time period; effects of covariates in one period to differ from those in others (Bass and Wittink 1975). In Chapter five, pooled data from five separate surveys are used to capture FPP features in different time period. To overcome the data limitation, several approaches are applied: including survey dummies in the main models to capture differences between periods; including interactions between FPP and education allowing the coefficient on education to vary

across FPP and periods; separately modelling the data from different surveys to check the results consistency. It is found that although there are data limitations, the results confirm the nature and direction of relationship between FPP and women's education.

In the analysis to assess the effect of national program of 'quality of care' on women's informed contraceptive choice (Chapter VI), given the cross sectional characteristics of the data set and lack of information about the program geographic coverage, it is not possible to precisely compare women with intervention and those without intervention over time. Alternatively, women are roughly divided into two time periods where the scaled intervention of 'quality of care' occurred in the second time period. Therefore, there is a potential that a woman in the first time period is involved in the pilot program of 'quality of care' while a woman in the second time period is not involved. However, given the huge geographic areas in China, the chance of such a misclassification might be small for the first time period. While for the second time period, the diffusion of programme ideas is likely to influence those women even in the areas without direct program intervention. Using panel data to distinguish interventions and non-interventions to examine the programme influences is the future research option.

7.4 Recommendation

Based on the findings of the study the following recommendations are drawn for ensuring the provision of informed choice of contraception.

- There is the need for access to comprehensive contraceptive information and services (including a range of emergency, short-acting, long-acting and permanent methods), to be provided equally to everyone voluntarily, free of coercion or violence. Special attention should be given to those living in rural areas, central region and low educated women in their access to these services.

Elimination of family planning workers authorization requirements for individuals/women accessing contraceptive and related information and services is highly essential.

- Strengthening the supply chain of contraception ensuring informed choices and availability is essential.
- Counselling and educational interventions on family planning and contraceptives should include skills building of family planning workers and health-care personnel (i.e. communications and negotiations) to meet communities' and individuals' specific needs.
- There is a dire need to encourage community participation, particularly those directly affected, to be engaged in contraceptive services.

7.5 FUTURE RESEARCH

The results of the study suggest that there is the need for:

- Further exploring of the underlying mechanisms on how FPP and education might affect fertility through the demand for children, the supply of children or the cost of fertility control;
- More updated high quality data to reveal pathways of determinants including institutional influence on the course of fertility outcomes;
- Collecting panel data to assess the adherence to quality of care, follow-up and informed contraceptive choices among various population sub-groups;
- Conducting research on the impact of FPP on women's physical and mental health and the policy's long-lasting social consequences of the lives of China's one-child generation and their parents.

REFERENCES

Allison, P. (1982) *Discrete-Time Methods For The Analysis Of Event Histories*. in Sociological Methodology, edited by S. Leinhardt. San Francisco: Jossey-Bass. P61–98

Arnold, F., and Liu, Z. (1986) *Sex Preference, Fertility And Family Planning In China.* Population and Development Review, 12: 221-246.

Banister, J. and Harbaugh C.W. (1994) *China's Family Planning Program: Inputs And Outcomes*. Centre for International Research (CIR) Staff Paper No.73.

Bass, F.M. and Wittink, D.R. (1975) *Pooling Issues And Methods In Regression Analysis With Examples In Marketing Research*. Journal of Marketing Research, 12(4):414-425.

Basten, S. and Jiang, Q. B. (2014) *China's Family Planning Policies: Recent Reforms And Future Prospects*. Studies in Family Planning, 45(4): 493-509.

Basu, A. M. (2002) *Why Does Education Lead To Lower Fertility? A Critical Review Of Some Of The Possibilities.* World Development, 30(10):1779-1790.

BBC. (2015) *China Media: Ageing Concerns*. http://www.bbc.co.uk/news/world-asia-china-30791589

Beech, H. (2013) *China Loosens Its One-Child Policy.* TIME Magazine (online edition), New York. http://world.time.com/2013/11/15/china-loosens-its-one-child-policy/. (21 August 2014).

Bhrolcháin, N. M. (1987) *Period Parity Progression Ratios And Birth Intervals In England And Wales, 1941-1971: A Synthetic Life Table Analysis*. Population Studies, 41: 103-125.

Birdsall, N., and Jamison, D. T. (1983) *Income And Other Factors Influencing Fertility In China.* Population and Development Review, 9: 651–675.

Bledsoe, C., J. Johnson-Kuhn, and J. Haaga. (1999) *Introduction, In Critical Perspectives On Schooling And Fertility In The Developing World. in* Caroline H. Bledsoe, John B. Casterline, Jennifer A. Johnson-Kuhn, and John G. Haaga, eds, Washington, D.C.: National Academy Press.

Bogue, D. J. (1967) *The End Of The Population Explosion*. Public Interest, 7:11–20.

Bongaarts, J. (1978) *A Framework For Analysing The Proximate Determinants Of Fertility*. Population and Development Review, 4**:** 105-132.

Bongaarts, J. and Potter, R. (1983) *Fertility, Biology And Behaviour: An Analysis Of The Proximate Determinants*. Academic Press, New York.

Bongaarts, J. (2003) *Completing The Fertility Transition In The Developing World: The Role Of Educational Differences And Fertility Preferences*. Population Studies, 57(3): 321−335. doi:10.1080/0032472032000137835.

Bongaarts, J., and Greenhalgh, S. (1985) *An Alternative To The One-Child Policy In China.* Population and Development Review, 11(4):585-617.

Bongaarts, J., and S. Sinding. (2011) *Population Policy In Transition In The Developing World.* Science, 333:574-575.

Bongaarts, J., W. P. Mauldin, and J. F. Phillips. (1990) *The Demographic Impact Of Family Planning Programs.* Studies in Family Planning, 21(6):299-310.

Boserup,E. (1965) *The Conditions Of Agricultural Growth: The Economics Of Agrarian Change Under Population Pressure*. London: Allen & Unwin.

Boserup,E. (1981*) Population and Technology*. Wiley-Blackwell.

Box-Steffensmeier, J., and B. S. Jones. (2004) *Event History Modeling. A Guide For Social Scientists*. Cambridge University Press

Bras, H. (2014) *Structural And Diffusion Effects In The Dutch Fertility Transition, 1987-1940*. Demographic Research, 30(5): 151−186. doi:10.4054/DemRes.2014.30.5.

Brown,J.J., Li, B. and Padmadas, S.S. (2010) *A Multilevel Analysis Of The Effects Of A Reproductive Health Programme That Encouraged Informed Choice Of Contraceptive Method Rather Than Use Of Officially Preferred Methods, China 2003-2005.* Population Studies, 64 (2):105-115.

Bruce,J. (1990) *Fundamental Elements Of The Quality Of Care: A Simple Framework.* Studies in Family Planning, 21(2):61-91.

Bulatao, R.A. and R. Lee, eds. (1983) *The Determinants Of Fertility In Developing Countries.* New York: Academic Press.

Cai, F., Wang, Z. M., Wang, M. Y. (2001) *Population And Family Planning Policy: Implementation And Impact.* CASS (Chinese Academy of Social Sciences) Working Paper Series No.14. In Chinese.

Cai, Y. (2012) *China's Demographic Reality And Future.* Asian Population Studies, 8(1): 1–3.

Cai, Y. (2010) *China's Below-Replacement Fertility: Government Policy Or Socioeconomic Development?* Population and Development Review, 36: 419-440.

Cai, Y., and Lavely, W. (2003) *China's Missing Girls: Numerical Estimates And Effects On Population Growth.* China Quarterly, 3(2):13-29.

Caldwell, J. C. (1980) *Mass Education As A Determinant Of The Timing Of Fertility Decline*. Population and Development Review, 6(2): 225−255. doi:10.2307/1972729.

Caldwell, J. C. (2005) *On Net Intergenerational Wealth Flows: An Update.* Population and Development Review, 31(4): 721-740.

Cassen, R. (1994) *Population and Development: Old Debates, New Conclusions*. New Brunswick, NJ:Transaction Publishers; US Third World Policy Perspectives No. 19.

Casterline, J. B. (2001) *Diffusion Processes And Fertility Transition: Introduction*. In: Casterline, J.B. (ed.). Diffusion process and fertility transition: Selected perspectives. Washington, DC: National Academy Press: 1−38.

Castro Martín, T. (1995) *Women's Education And Fertility: Results From 26 Demographic And Health Surveys*. Studies in Family Planning, 26(4): 187-202. doi:10.2307/2137845.

Che,Y. (2011) *Reproduction Within Different Population Policy Environments In Rural China:1979-2000.* PhD thesis. University of London, London School of Hygiene & Tropical Medicine.

Chen, C. C., and Lee, Y. T. (2008) *Leadership And Management In China*. Cambridge University Press 2008.

Chen, J., Retherford, R. D., Choe, M. K., Li, X., and Hu, Y. (2009) *Province-Level Variation In The Achievement Of Below-Replacement Fertility In China.* Asian Population Studies, 5:309-327.

Chen, S. Y. (2002) *Economic Reform And Social Change In China: Past, Present, And Future Of The Economic State.* International Journal of Politics, Culture, and Society, 15 (4):569-589.

China Family Planning Yearbook (CFPYB) Editorial Office. (1993) *China Family Planning Yearbook 1992.* Beijing: People's Medical Publishing House. In Chinese.

Chow, G. C. (2004) *Economic Reform And Growth In China*. Annals of Economics and Finance, 5: 127-152.

Chow, G. C. (2011) *Economic Planning In China.* Princeton University CEPS Working Paper No. 219 June.

Chu, J. H. (2001) *Prenatal Sex Determination And Sex-Selective Abortion In Rural Central China*. Population and Development Review, 27 (2):259-81.

Cleland, J. (2001) *Potatoes And Pills: An Overview Of Innovation-Diffusion Contribution To Explanations Of Fertility Decline.* In: Casterline, J. B. (ed.). Diffusion process and fertility transition: Selected perspectives. Washington, DC: National Academy Press: 39−65.

Cleland, J. (2002) *Education And Future Fertility Trends, With Special Reference To Mid-Transitional Countries.* Population Bulletin of the United Nations Special Issue, (48/49): 183−194. http://www.un.org/esa/population/publications/completingfertility/bulletin-english.pdf.

Cleland, J., and Wilson, C. (1987) *Demand Theories Of The Fertility Transition: An Iconoclastic View*. Population Studies, 41 (1): 5-30.

Coale, A. J. (1984) *Rapid Population Change In China, 1952–1982*. Washington, DC: National Academy Press.

Coale, A. J., and Chen S. L. (1987) *Basic Data On Fertility In The Provinces Of China, 1940-82.* Paper of the East-West Population Institute. Number 104.

Coale, A. J., Hoover, E. M. *Population Growth And Economic Development In Low Income Countries.* Princeton, NJ: Princeton University Press; 1958.

Colleran H, Jasienska G, Nenko I, Galbarczyk A, Mace R. (2014) *Community-Level Education Accelerates The Cultural Evolution Of Fertility Decline.* Proc. R. Soc. B 281: 20132732.

Demeny, P. (1988) *Social Science And Population Policy.* New York, NY: Population Council Center for Policy Studies. Working Paper No. 138.

Demeny, P. (2003) *Population Policy: A Concise Summary.* Population Council Working Paper No.173

Dex, S. (1995) *The Reliability Of Recall Data: A Literature Review*. Bulletin of Sociological Methodology, 49 (1): 58-89.

Diamond, I., M. Newby and S. Varle, (1999) *Female Education And Fertility: Examining The Link.* in Critical Perspectives on Schooling and Fertility in the Developing World, Caroline H.Bledsoe, John B. Casterline, Jennifer A. Johnson-Kuhn, and John G. Haaga, eds, Washington,D.C.: National Academy Press.

Dumbaugh, K., and M. F. Martin . (2009) *Understanding China's Political System.* Congressional Research Service Report for Congress.

Editorial Board of Population Research (EBPR). (2007) *Practice And Implication Of Two Children Policy.* Population Research 32 (4) :33-49. In Chinese.

Ehrlich, P. (1968) *The Population Bomb*. New York: Ballantine.

Eloundou-Enyegue, P. (1999) *Fertility And Education: What Do We Now Know?* in Critical Perspectives on Schooling and Fertility in the Developing World, Caroline H. Bledsoe, John B. Casterline, Jennifer A. Johnson-Kuhn, and John G. Haaga, eds, Washington, D.C.: National Academy Press.

Entwisle, B., and W. M. Mason. (1985) *Multilevel Effects Of Socioeconomic Development And Family Planning Programs On Children Ever Born.* American Journal of Sociology, 91(3):616-649.

Feeney, G., and Wang, F. (1993) *Parity Progression And Birth Intervals In China: The Influence Of Policy In Hastening Fertility Decline.* Population and Development Review, 19(1):61-101.

Feeney, G., and Yu, J. (1987) *Period Parity Progression Measures Of Fertility In China.* Population Studies, 41: 77-102.

Feeney, G., and Yuan, J. H. (1994) *Below Replacement Fertility In China? A Close Look At Recent Evidence.* Population Studies, 48(3):381-394.

Feeney, G., Wang, F., Zhou, M. K., and Xiao, B. Y. (1987) *Recent Fertility Dynamics In China: Results From The 1987 One Per Cent Population Survey.* Population and Development Review, 15(2):297-322.

Feng, X. T. (2014) *Social Consequences Of Family Planning Policy Modification 'Two Children Policy If One Parent From One Child Family'*. Journal of China National School of Administration, 5:15-20.

Finkle, J. L., Crane, B. B. (1975) *The Politics Of Bucharest: Population, Development, And The New International Economic Order*. Population and Development Review, 1: 87-114.

Finkle, J. L., Crane, B. B. (1985) *Ideology And Politics At Mexico City: The United States And The 1984 International Conference On Population*. Population and Development Review,11:1-28.

Foster, A., and N. Roy. (1997) *The Dynamics Of Education And Fertility: Evidence From A Family Planning Experiment.* University of Pennsylvania mimeo.

Freedman, R., and B. Berelson. (1978) *The Record Of Family Planning Programs.* Studies in Family Planning, 7(1):1-40.

Freedman, R., and Wang, F. (1993) *Parity Progression And Birth Interval In China: The Influence Of Policy In Hastening Fertility Decline.* Population and Development Review, 19: 61-101.

Frejka, T., Gavin, W. J., and J. P. Sardon. (2010) *East Asian Childbearing Patterns And Policy Developments.* Population and Development Review, 36(3): 579–606.

Gertler, P., and J. Molyneaux (1994) *How Economic Development And Family Planning Combined To Reduce Fertility In Indonesia.* Demography, 31:33-64.

Godwin, R.K. (1975) *Comparative Policy Analysis: the Study of Population Policy Determinants in Developing Countries*. Lexington, Mass.: Lexington Books.

Goodkind, D. (2015) *The Claim That China's Fertility Restrictions Contributed To The Use Of Prenatal Sex Selection: A Sceptical Reappraisal*. Population Studies, 69 (3): 263-279.

Goodkind, D. (2011) *Child Underreporting, Fertility, And Sex Ratio Imbalance In China*. Demography, 48:291-316.

Greenhalgh, S. (1990) *Population Studies In China: Privileged Past, Anxious Future.* Australian Journal of Chinese Affairs, 24: 357-384.

Greenhalgh, S. (1994) *Controlling Births And Bodies In Village China.* American Ethnologist, 21:3-30.

Greenhalgh, S. (1986) *Shift In China's Population Policy, 1984-86: View From The Central, Provincial, And Local Levels.* Population and Development Review, 12(3):491-515.

Greenhalgh, S. (2003) *Science, Modernity, And The Making Of China's One-Child Policy.* Population and Development Review, 29(2):163-196.

Grimes, S. (1998) *From Population Control To 'Reproductive Rights': Ideological Influences In Population Policy*. Third World Quarterly, 19(3):375-393.

Gu, B. C., and K. Roy. (1995) *Sex Ratio At Birth In China, With Reference To Other Areas Of East Asia: What We Know*. Asia-Pacific Population Journal, 10 (3):17-32.

Gu, B. C., and Li, J. X. (2010) *The Debate On China's Population Policy In The 21st Century*. Social Sciences Academic Press: Beijing

Gu, B., Wang, F., Guo, Z. G., and Zhang, E. l. (2007) *China's Local And National Fertility Policies At The End Of The Twentieth Century*. Population and Development Review, 33(1):129-147.

Hardee, K., and Banister, J. (1988) *Fertility Policy And Implementation In China, 1986-1988.* Population and Development Review, 14: 245-286.

Hardee, K., Xie, Z., and Gu, B. C. (2004) *Family Planning And Women's Lives In Rural China.* International Perspectives on Sexual and Reproductive Health, 30: 68-76.

Hardee, K., Feranil I., Boezwinkle J. and Clark B. (2004) *The Policy Circle: A Framework For Analysing The Components Of Family Planning, Reproductive Health, Maternal Health, And HIV/AIDS Policies.* Policy Working Paper Series No.11.

Hardin, G. (1968) *The Tragedy Of The Commons*. Science, 162: 1243-48.

Hinde, A. (1998) *Demographic Methods.* London: Arnold, a member of the HodderHeadlme Group, 107-120.

Hodgson, D., and S. C. Watkins. (1997) *Feminists And Neo-Malthusians: Past And Present Alliances*. Population and Development Review, 23(3):469-523.

Hu, J. (2006) *Effects And Social Implications Of China's One-Child Policy*. Journal of Population and Social Studies, 14 (2):77-99.

Jain, A.K. (1989) *Fertility Reduction And The Quality Of Family Planning Services*. Studies in Family Planning, 20(1):1-16.

Jain, A. K., and Ross, J. A. (2012) *Fertility Differences Among Developing Countries: Are They Still Related To Family Planning Program Efforts And Social Settings?* International Perspectives on Sexual and Reproductive Health, 38: 15-22.

James, K. D., Skirbekk, V., and Bavel, J. V. (2012) *Education And The Global Fertility Transition - Foreword*. Vienna Yearbook of Population Research, 10: 1-8.

Jejeebhoy, S. J. (1995) *Women's Education, Autonomy, And Reproductive Behaviour: Experience From Developing Countries*. Oxford: Clarendon Press.

Jiang, Q. B., S. Z. Li, and M.W. Feldman. (2013) *China's Population Policy At The Crossroads: Social Impacts And Prospects.* Asian Journal of Social Science, 41(2): 193-218.

Jiang, Q. B., S. Z. Li, and M.W. Feldman. (2011) *Demographic Consequences Of Gender Discrimination In China: Simulation Analysis Of Policy Options.* Population Research and Policy Review, 30(4): 619-638.

Kaufman, J., Zhang, E., and Xie, Z. (2006) *Quality Of Care In China: Scaling Up A Pilot Project Into A National Reform Program.* Study Family Planning, 37: 17-28.

Kaufman, J., Zhang, Z., Qiao, X., and Zhang, Y. (1989) *Family Planning Policy And Practice In China: A Study Of Four Rural Counties.* Population and Development Review, 15: 707-729.

Kelley, A. C. (1988) *Economic Consequences Of Population Change In The Third World*. J Econ Lit, 27:1685-1728.

Kelley, A. C. and Schmidt, R. M. (1994) *Population And Income Change: Recent Evidence.* Washington, DC: World Bank. World Bank Discussion Paper 249.

Khan,H.R. and Shaw, J. E. (2011) *Multilevel Logistic Regression Analysis Applied To Binary Contraceptive Prevalence Data*. Journal of Data Science, 9: 93-110.

Lance, L., and Enrico, M. (2004) *The Effect Of Education On Crime: Evidence From Prison Inmates, Arrests And Self-Reports*. American Economic Review, 94(1):155-189.

Larvely, W. R., and Freedman, R. (1990) *The Origins Of The Chinese Fertility Decline.* Demography, 27:357-367.

Lee, J. and Wang F. (1999) *Malthusian Models And Chinese Realities: The Chinese Demographic System 1700-2000*. Population and Development Review, 25 (1): 33-65.

Lee, J. and Wang F. (2001) *One Quarter Of Humanity: Malthusian Mythology And Chinese Realities 1700-2000*. London: Harvard University Press.

Lee, R. D., and Miller, T. (1990) *Population Growth, Externalities To Childbearing, And Fertility Policy In The Third World.* Proceedings of the World Bank Annual Conference on Development Economics, 1990. Supplement to The World Bank Economic Review and to The World Bank Research Observer 275-304.

Lewis, J. W. (1963) *Leadership In Communist China*. New York: Cornell University Press.

Lewis, J.W. (1970) *Party Leadership And Revolutionary Power In China*. London: Cambridge University Press.

Liang, Q., and Lee, C. (2006) *Fertility And Population Policy: An Overview*, In: Poston, D. L., Lee, C., Chang, C., Mckibben, S. L. and Walther, C. S. (eds.) Fertility, Family Planning, and Population Policy in China. London and New York: Routledge.

Lieberthal, K. (1995) *Governing China: From Revolution Through Reform*. New York: W.W. Norton.

Liou, K. T. (2000) *State-Society Relations In Post-Mao Chinese Economic Reforms: Changes And Challenges.* International Journal of Economic Development, 2(1):132-154.

Liu, Y.R. (2004) *Contraception Use Among Married Women In China*. Chinese Journal of Family Planning. 5:260-262. In Chinese.

Liu, Y. Q. (2013) *Experts Appeal For A Reform Of Population Policy*. Chinese Economic Weekly, 10(43): 40–42. In Chinese.

Lu Y., and Zhai Z. W (edit). (2009) *Sixty Years Of New China Population.* China Population Press: Beijing. In Chinese.

Ma, Y.C. (1979) *A New Theory Of Population*. Beijing, Beijing Publishing House. In Chinese.

Mai, Y. H., X. J. Peng, and W. Chen. (2013) *How Fast Is The Population Ageing In China?* Asian Population Studies, 9(2): 216-239.

Magadi, M.A. and Curtis, S.L. (2003) *Trends And Determinants Of Contraceptive Method Choice In Kenya.* Studies in Family Planning, 34(3):149-159.

Malthus, T. (1798) *An Essay On The Principle Of Population*. Electronic Scholarly Publishing Project.

Mao, Z.Y. and Luo, H. (2013) *Difference Between Fertility Intention And Fertility Behaviour For Women Subject To The Two Children Policy: An Empirical Study Based On The Theory Of Planned Behaviour*. Population Research, 37(1):84-93. In Chinese.

Martin, T.C. (1995) *Women's Education And Fertility: Results From 26 Demographic And Health Surveys.* Studies in Family Planning, 26 (4):187-202.

Mason, K.O. (1986) *The Status Of Women: Conceptual And Methodological Debates In Demographic Studies.* Sociological Forum, 1:284-300

Mason, A. (2001) *Population Policies And Programs In East Asia. East-West Centre Occasional Papers*. Population and Health Series. No.123.

May, J.F. (2012) *World Population Policies: Their Origin, Evolution, And Impact*. Springer Science Business Media B.V.: Springer.

McIntosh, C. A. and Finkle, J. (1995) *The Cairo Conference On Population And Development: A New Paradigm.* Population and Development Review, 21(2):223-60.

McNicoll, G. (1975) *Community-Level Population Policy: An Exploration.* Population and Development Review, 6:441-462.

McNicoll, G. (2001) *Government And Fertility In Transitional And Post-Transitional Societies.* Population and Development Review, A supplement to Vol.27:129-159.

McQuillan, K. (1982) *On The Development Of Marxist Theories Of Population*. Canadian Studies in Population, 9:109-116.

Merli, M. G., and Herbert, L. S. (2002) *Has The Chinese Family Planning Policy Been Successful In Changing Fertility Preferences?* Demography, 39: 557-572.

Ministry of Foreign Affairs (MFA). (2015) *Premier Li Keqiang Meets The Press*. http://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1247170.shtml

Morgan, P. S., Guo, Z., and Hayford, S. R. (2009) *China's Below-Replacement Fertility: Recent Trends And Future Prospects.* Population and Development Review, 35: 605-629.

National Bureau of Statistics (NBS). (2010) *China Compendium Of Statistics 1949-2008.* China Statistics Press: Beijing. In Chinese.

National Bureau of Statistics of China (NBS) and East-West Center. (2007) *Fertility Estimates For Provinces Of China, 1975-2000*. Beijing: China Statistics Press. In

Chinese.

National Health and Family Planning Commission (NHFPC). (2013a) *Learn The Central Government's Spirit Of Determination; Insist On The Nation's Basic Principles Of Family Planning; Take Incremental Steps To Adapt And Enhance Family Planning Policies.* National Health and Family Planning Commission, Beijing. In Chinese. http://www.nhfpc.gov.cn/jczds/s3578/201311/2113e68c25704b6c927bc722059e751e.shtml. (March 10, 2015)

National Health and Family Planning Commission (NHFPC). (2013b) *Deputy Director Wang Peian Of NHFPC Of PRC Answers Journalists' Questions On Holding To The Basic National Policy Of Family Planning.* National Health and Family Planning Commission, Beijing. In Chinese. http://www.nhfpc.gov.cn/xcs/s3574/201311/cc3f1bc9dd24488ab9ef1b08e93e3a76.shtml. (March 10, 2015)

National Population and Family Planning Commission (NPFPC) (2007) *Population And Family Planning History Of China*. China Population Press: Beijing. In Chinese.

National People's Congress of the People's Republic of China (NPC). (2002) *Population And Family Planning Law Of The People's Republic Of China*. China Population Publishing House: Beijing. In Chinese.

National Academy of Sciences (NAS). (1986) *Population Growth And Economic Development: Policy Questions*. Washington, DC: National Academy Press.

Ogawa, N., and Retherford, R. D. (1993) *The Resumption Of Fertility Decline In Japan:1973-92.* Population and Development Review, 19:703-741.

Pebley, A.R. (1998) *Demography And The Environment*. Demography, 35(4):377-389.

Peng, X. Z. (1991) *Demographic Transition In China*. Oxford: Oxford University Press.

Peng, X.Z. and Guo Z.G. (2000) *The Changing Population Of China*. Oxford: Blackwell.

Perry, E. J. (1985) *Rural Violence In Socialist China*. China Quarterly, 103:414-40.

Perry, E. J. (1994) *Trends In The Study Of Chinese Politics: State-Society Relations*. China Quarterly, 139:704-13.

Philips,J.F., Simmons, R., Koening, M.A., and Chakraborty,J. (1988) *Determinants Of Reproductive Change In A Traditional Society: Evidence From Matlab, Bangladesh*. Studies in Family Planning, 19(6):313-334.

Poston, D. L.,Jr. and Gu, B. (1987) *Social Economic Development, Family Planning And Fertility In China.* Demography, 24: 531-551.

Poston, D. L.,Jr. (1992) *Patterns Of Contraceptive Use In China*. In Poston, D. L.,Jr. and Yaukey D (edt). The Population of Modern China. New York and London: Plenum Press.

Poston, D. L.,Jr. (2000) *Social And Economic Development And The Fertility Transitions In Mainland China And Taiwan*. Population and Development Review, 26:(Supplement): 40-60.

Poston, D. L.,Jr., Lee,C.F., Chang, C.F., Mckibben, S.L and Walther, C.S. (2006) *Fertility, Family Planning And Population Policy In China*. Abingdon, Oxon: Routledge.

Poston, D. L., Jr., E. Conde, and B. DeSalvo. (2011) *China's Unbalanced Sex Ratio At Birth, Millions Of Excess Bachelors And Societal Implications.* Vulnerable Children and Youth Studies, 6(4): 314-320.

Poston, D. L., Jr. and Bouvier L.F. (2016) Population and Society An Introduction to Demography 2nd edition (Forthcoming).

Potter, J. E. (1977) *Problems In Using Birth-History Analysis To Estimate Trends In Fertility.* Population Studies, 31(2):335-364.

Rasbash, J., Steele, F., Browne, W. and Goldstein,H. (2009). *A User's Guide To Mlwin. Version 2*, Centre for Multilevel Modelling, University of Bristol, UK.

Ren,Q. and Zheng,X.Y. (2006) *Behavioue Change Of Chinese Married Women On Contraception Use: 1988-2001*. Chinese Journal of Population Science, 3: 28-38. In Chinese.

Reng,N., Su, P., Guang, H.T., Wu, C.J., Zhou, J.L., Su, N., Liao, J.Y. and Xiong, C.L. (2003) *Analysis On Influencing Factor For Informed Choice Of Family Planning Among Rural Women*. Chinese Journal Public Health, 19(11):1288-1289. In Chinese.

Retherford, R. D., Choe, M. K., Chen, J. J., Li, X. R., and Cui, H. Y. (2005) *How Far Has Fertility In China Really Declined?* Population and Development Review, 31:57-84.

Retherford, R.D., N. Ogawa, R. Matsukura, and H. Eini-Zinab. (2010*) Multivariate Analysis Of Parity Progression-Based Measures Of The Total Fertility Rate And Its Components Using Individual-Level Data*. Demography, 47(1):97-124.

Ross, J. A., and C. B. Lloyd. (1992) *Methods For Measuring The Fertility Impact Of Family Planning Programs: The Experience Of The Last Decade*. New York: Population Council.

Ross,J, Hardee, K., Mumford,E. and Eid, S. (2002) *Contraceptive Method Choice In Developing Countries*. International Family Planning Perspectives, 28(1): 32-40.

Roush, W. (1994) *Population: The View From Cairo*. Science, 265:1164-1167.

Saich, T. (2011) *Governance And Politics Of China*. Hampshire: Palgrave Macmillan.

Schults, T. P., and Zeng, Y. (1999) *The Impact Of Institutional Reform From 1979 Through 1987 On Fertility In Rural China*. China Economic Review, 10:141-160.

Seiber, E.E. Bertrand, J.T. and Sullivan,T.M. (2007) *Changes In Contraceptive Method Mix In Developing Countries*. International Family Planning Perspectives, 33(3):117-123.

Simon, J. L. (1981) *The Ultimate Resource*. Princeton, NJ: Princeton University Press.

Sinding, S. W. (2000) *The Great Population Debates: How Relevant Are They For The 21st Century?* American Journal of Public Health, 90(12):1841-45.

Singer, J.D. and J.B.Willett. (2003) *Applied Longitudinal Data Analysis: Modelling Change And Event Occurrence*. Oxford University Press:Oxford.

Song, J., Tuan C. H., and Yu, J. Y. (1985) *Population Control In China: Theory And Applications.* New York: Praeger Publishers.

Spillane, J. P., Reiser, B. J., and Reimer, T. (2002) *Policy Implementation And Cognition: Reframing And Refocusing Implementation Research*. Review of Educational Research, 72(3): 387-431.

Srinivasan, K. (1998) *Basic Demographic Techniques And Applications*. New Delhi. Thousand Oaks. London: Sage Publications.

StataCorp. (2011). *Stata 12 Base Reference Manual*. College Station, TX: Stata Press.

Steele, F., Curtis,S.L. and Choe,M.K. 1999. *The Impact Of Family Planning Service*

Provision On Contraceptive Use Dynamics In Morocco. Studies in Family Planning, 30(1): 28-42.

Stephenson, R. and Tsui,A.O. (2002) *Contextual Influences On Reproductive Health Service Use In Uttar Pradesh, India.* Studies in Family Planning, 33(4):309-320.

Tien, X. Y. (1980) *Wan, Xi, Shao: The China Solution*. International Family Planning Perspectives, 6: 65-73.

Tien, H. Y. (1984) *Induced Fertility Transition: Impact Of Population Planning And Socio-Economic Change In The People's Republic Of China*. Population Studies, 38: 385-400.

Tsui, A. O. (2001) *Population Policies, Family Planning And Fertility: The Record.* Population and Development Review, A supplement to Vol.27:184-204.

Tsui, A. O. and D. Bogue. (1978) *Declining World Fertility: Trends, Causes And Implications.* Population Bulletin, 33(4):2-56.

Tucker, C., and J. Van Hook. (2013) *Surplus Chinese Men: Demographic Determinants Of The Sex Ratio At Marriageable Ages In China*. Population and Development Review, 39(2): 209-229.

Tyrene, W. (2006) *China's Longest Campaign: Birth Planning In The People's Republic, 1949–2005.* Ithaca, NY: Cornell University Press.

UNESCO. (1998) *World Education Report 1998: Teachers And Teaching In A Changing World.* UNESCO Publishing.

UNFPA. (1996) *Program Of Action Adopted At The International Conference On Population And Development, Cairo 5-13 September, 1994.* New York: UNFPA.

United Nations. (2014) *World Urbanization Prospects: The 2014 Revision, Highlights* (ST/ESA/SER.A/352).

United Nations. (2015) *World Population Prospects: The 2015 Revision, Key Findings And Advance Tables.* Working Paper No. ESA/P/WP.241.

United Nations. (1978*) Methods Of Measuring The Impact Of Family Planning Programmes On Fertility: Problems And Issues.* New York: United Nations.

United Nations. (1987a) *A Comparative Evaluation Of Data Quality In Thirty-Eight World Fertility Surveys.* New York: United Nations.

United Nations. (1987) *Fertility Behaviour In The Context Of Development Evidence From The World Fertility Surveys.* Population Studies no. 100. New York: United Nations.

United Nations. (1993) *Proceedings Of The United Nations Expert Group Meeting On Population Polices And Programmes.* Cairo, Egypt, 12-16 April 1992. St/ESR.R/128. New York: United Nations.

United Nations. (2010) *World Population Policies 2009*. ST/ESA/SER.A/293.

Waldmeir, P. (2013) *China Counts Cost Of One Child Policy.* Financial Times Online, London. http://www.ft.com/cms/s/0/f60a25c8-6c52-11e2-b73a-00144feab49a.html#axzz2rnu9L14f. Accessed 21 August 2014.

Wang, C. (2012a) *History Of The Chinese Family Planning Program: 1970-2010.* Contraception, 85: 563-569.

Wang, C. (2012b) *Trends In Contraceptive Use And Determinants Of Choice In China:1980-2010.* Contraception 85: 570-579.

Wang, F. (2005) *Can China Afford To Continue Its One-Child Policy?* Asia Pacific Issues: the East-West Centre No. 77.

Wang, F. (2011) *The Future Of A Demographic Overachiever: Long-Term Implications Of The Demographic Transition In China*. Population and Development Review, 37(Suppl.): 173-190.

Wang, F. (2012) *Family Planning Policy In China: Measurement And Impact On Fertility.* MPRA Paper No. 42226, posted 27. October 2012 14:56 UTC.

Wang, F., Cai, Y., and Gu, B. C. (2012) *Population, Policy, And Politics: How Will History Judge China's One-Child Policy?* Population and Development Review, 38 (supplement): 115-129.

Winckler, E. A. (2002) *Chinese Reproductive Policy At The Turn Of The Millennium: Dynamic Stability.* Population and Development Review, 28(3):379-418.

Wolf, A. P. (1986) *The Preeminent Role Of Government Intervention In China's Family Planning Revolution.* Population and Development Review, 12: 101-116.

World Health Organization (WHO). **(**2014) *Maternal Mortality Country Profiles***.** http://www.who.int/gho/maternal_health/countries/chn.pdf?ua=1 (November 6, 2014)

World Bank. (1984) *World Development Report 1984*. Oxford University Press: New York.

World Bank. (2015) *China Overview*. http://www.worldbank.org/en/country/china/overview (February 6, 2015)

Wu, J.Q. (2008a) *Counselling About Informed Choice Of Contraception.* Chinese Journal of Family Planning, 3:132-136. In Chinese.

Wu,S.C. (2008b) *Side Effect Of Contraceptives And Informed Choice Of Contraception*. Journal of Obstetrics and Gynecology, 24(3):143-44. In Chinese.

Yang, D. T., and Chen, D. D. (2004) *Transformations In China's Population Policies And Demographic Structure.* Pacific Economic Review, 9(3):269-290.

Zeng, Y. (2007) *Options For Fertility Policy Transition In China*. Population and Development Review, 33(2): 215-246.

Zeng, Y., Tu, P., Gu, B. C., Xu, Y., Li, B. H., and Li, Y. P. (1993) *Causes And Implications For The Recent Increase In The Reported Sex Ratio At Birth In China.* Population and Development Review, 19:283-302.

Zhai, Z. W., and Li, L. (2014) *Family Planning Policy Relaxation*. Journal of China National School of Administration, 5:23-35.

Zhang, G. and Z. Zhao. (2006) *Reexamining China's Fertility Puzzle: Data Collection And Quality Over The Last Two Decades.* Population and Development Review, 32(2): 293–321.

Zhang, Y.Z. (2007) *Factors Influence Contraceptive Informed Choice Among Rural Women In Henan Province*. Population Research, 31(4):89-96. In Chinese.

Zhang, X. B., Jin, Y., and S. L. Wang. (2011) *China Has Reached The Lewis Turning Point*. China Economic Review, 22(4): 542-554.

Zheng, Z. Z. (2004) *Fertility Desire Of Chinese Women*. Chinese Journal of Population Science, 5:73-80. In Chinese.

Zheng, Z. Z., Y. Cai, F. Wang, and B.C. Gu. (2009) *Below-Replacement Fertility And Childbearing Intention In Jiangsu Province, China*. Asian Population Studies, 5(3): 329-347.

Zhuang, Y.E., Jiang,Y., Wang,Z.L., Li,C.F., Qi,J.N., Wang,H.,Liu,H.Y., Li,B.H. and Qin,M. (2014) *Fertility Intention Of Rural And Urban Residents In China:*

Results From The 2013 National Fertility Intention Survey. Population Research, 38(3):3-13. In Chinese.