Second Birth Interval in China since 1970s: The Role of Birth Spacing Policy

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Abstract Though birth interval has beneficial effects on health status of the mother and their children, it is affected by range of factors some of which are rooted in social and cultural norms and the reproductive behaviors. China is one of the few countries regulating the number and timing of births, and yet the international community has little understanding and discussion of the second birth interval in China. This study examines the trends in and the impact of birth spacing policy on the second birth interval in China since 1970s using the population monitoring data in 121 Chinese counties. The birth spacing policy plays a significant role in regulating people's fertility behaviors thus slowing down population growth in China. Specifically, changes in second birth intervals have gone through three stages, a long-term stability before 1990s, an increase from 1990 to 2005 and a decline since 2006, implying a dynamic relationship with the birth interval regulation. Conditions for continuing the current birth spacing policy aiming at later birth, longer interval and less children no longer exist. Thus, the focus on birth spacing needs to be switched from a population control orientation to a health orientation.

Keywords Second birth interval, birth spacing policy, China

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Introduction

Under the special background of China, it has been utilized as a means to control population growth, and has played a vital role in adjusting the fertility pattern of reproductive-age population and mitigating population growth (Qiao, 1989; Liu, 2011).Birth spacing played a vital role amid the evolvement of China's fertility policy, which advocated “later birth, longer interval and less children” in early 1970s. The Central Government specifically urged that "it's preferable for one couple to have only one child and no more than two children, with birth spacing being at least 3 years” in 1978, followed by the specific requirements for second birth interval (SBI) as stipulated in the provincial family planning regulations. Some provinces have, ever since 2002 successively revoked the requirements for SBI. In late 2013 when selective two-child policy was put into implementation, more provinces adjusted their birth spacing. By the end of 2014, 23 out of 31 provinces (municipalities/regions) have liberalized the birth spacing. The timing for respective provinces to abolish birth spacing is indicative of their different perception of birth spacing.

Currently, for either policy makers or the academic community, their perception of and discussion over the SBI, particularly its connections with fertility policy adjustment, remain quite limited. Existing relevant studies mainly focus on the fluctuations in SBI before 2000 and the impacts of birth-number policy in different regions on birth spacing. These studies fail to cast an eye over the correlation between the dynamic variations in birth spacing policy and the variations in birth interval. Among others, it might result from the lack of empirical data for studying SBI. To better understand the evolution and main characteristics of SBI among China's reproductive-age women and get to know its present status and development law, we need the corresponding data support. In addition, the whole course of establishment, revision and cancelation of birth spacing policy in respective Chinese provinces since 1980 has provided a premise and real scenario for examining the impacts of birth spacing policy on fertility behaviors.

By analyzing the impacts of birth spacing policy on the SBI, this study expects to provide helpful reference for the new round of amendments to the Regulations on Population and Family Planning in respective provinces after the roll-out of the "Universal Two-Child Policy". Furthermore, in population projection, "birth estimates are sensitive to the change in birth spacing model" (Chen, 1995). In the projection the setting of birth spacing will turn out one of the crucial parameters affecting the release of the accumulated fertility potential after the roll-out of "Universal Two-Child Policy". Given the limited domestic studies on birth spacing and cohort birth spacing indicators (Wang, 2015), this study also expects to provide the fundamental data on SBI for improving the accuracy of the projection of new-born population in the future years.

Given the fact that birth spacing has been revoked successively in respective provinces in the past 10 years, empirical data are also needed to validate and explain the assumption of whether such changes in policy scenario have led to the decline in SBI.

Data and methodology

The data used herein are derived from the data of 2013 as reported by the 121-county population monitoring system of the National Health and Family Planning Commission (NHFPC). On the basis of the 5th National Population Census data, 121 counties were randomly selected from eastern, central and western regions to report the individual data of gross population on a yearly basis as a monitoring system. The gross population was 81.11 million in 2013, accounting for 5.96% of China's gross population in 2013[4]; the number of reproductive-age woman aged 15-49 was 21.766 million, accounting for 26.83% of the gross population of 121 counties, and this proportion is in close proximity to the share of reproductive-age women (27.39%) obtained from the National Population Change Sampling Survey in 2013[5]. By further comparing the age structure of married women aged 15-49, all age groups show minor differences (see Table 1), indicating that the population monitoring data of these 121 counties are adequate to represent the fertility pattern of reproductive-age women across the country.

Table 1 Age Structure of Married Women of Childbearing Age in 2013 (%)

Age group	121-county reporting system	National Population Change Sampling Survey in 2013
15-19	0.21	0.51
20-24	6.94	7.21
25-29	17.02	15.82
30-34	18.18	16.81
35-39	17.85	17.61
40-44	21.00	21.64
45-49	18.79	20.39

Through the primary keys of the databases of the monitoring system, we matched the children database with the women database and sorted out women who have given birth to at least two children. Eventually, we obtained our samples (n= 5135632), with basic information shown in Table 2. Women who ever born two children were selected to calculate the SBI based on their birth history. While analyzing the SBI, in view of the current medical advancements, a 7 month old fetus can survive preterm birth. Therefore, we took 7 months as the minimum birth interval and 240 months as the maximum birth interval.

We used descriptive method to explore the trends of SBI and made comparison before and after birth spacing policies enforcement in respective provinces. The study also involves the collation and contents analysis of birth spacing policies of provinces level and their impact on SBI.

[4] The gross population of 2013 referred to the derivative data from 2013 national population change sampling survey. Source: Department of Population and Employment Statistics of National Bureau of Statistics. China Statistical Yearbook (2014), China Statistics Press, 2014.

[5] Source: These proportions are calculated based on the sample data obtained from the national population change sampling survey in 2013, with sampling ratio being 0.822‰. Source: Department of Population and Employment Statistics of National Bureau of Statistics. China Population and Employment Statistical Yearbook (2014), China Statistics Press, 2014.

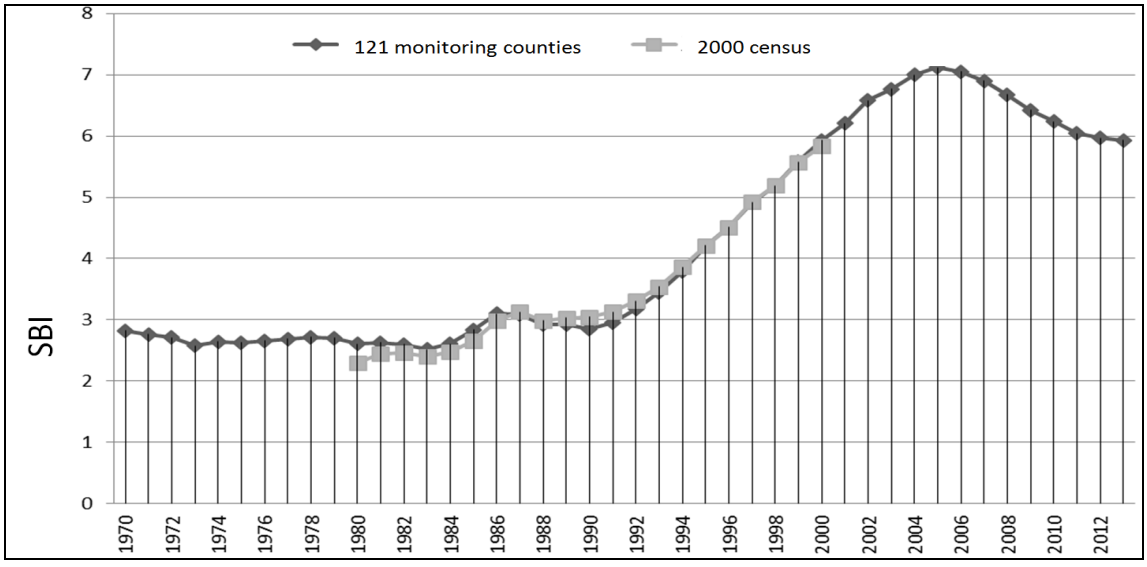
Table 2 Background of Women Who Have Given Birth to Two Children in the Database of 121 Population Monitoring Counties in 2013

Category		N	%)
Area	Rural	3653575	92.7
	Urban	287364	7.3
Ethnic Group	Han	3641492	70.9
	Minorities	1494140	29.1
Age	15-19	1668	0.0
	20-29	256230	6.5
	30-39	1031337	26.1
	40-49	1905358	48.3
	50-59	657344	16.7
	60+	93203	2.4
Education	Primary or below	970140	24.9
	Junior High	2684613	68.9
	Senior High	206436	5.3
	Tertiary or above	36235	0.9

Source: Calculated based on the data of 2013 as reported by the 121-county population monitoring system of the former NHFPC. Given the absence of certain variables, there are minor differences with the aggregate figures.

By comparing the analytic results with those obtained from the long-questionnaire data of 2000 National Population Census (Wang, 2013), we found that the SBIs during 1980-2000 as calculated from the two data sources show identical variation trends, and with the time approaches, the average SBI also show close proximity. This fact fully demonstrates the sound representativeness of the monitoring data of 121 counties (see Figure 1).

Figure 1 SBI in China from Different Data Sources



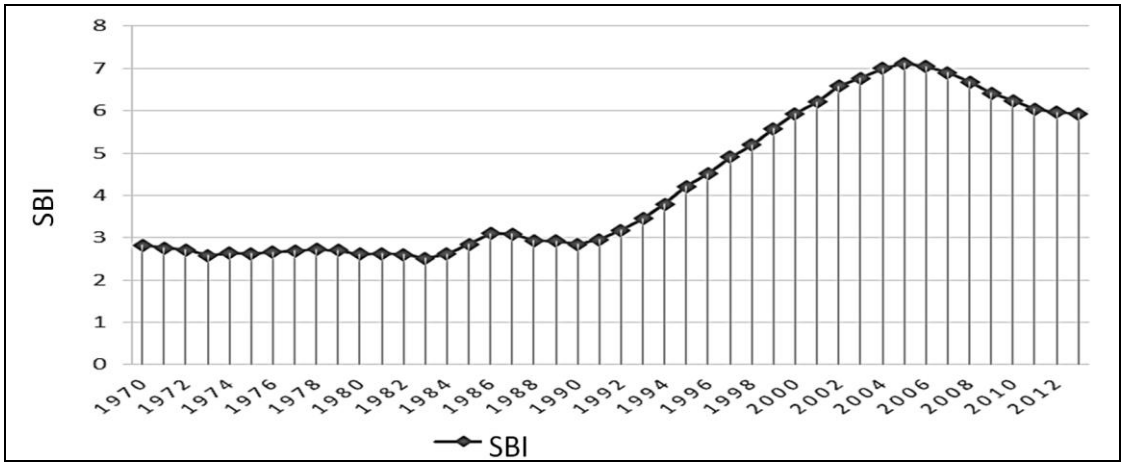
Source: 1) Data of 2013 as reported by the 121-county population monitoring system of the former National Population and Family Planning Commission; 2) Wang Jun. "Study on the hierarchical model for measuring the impacts of China's fertility policy on SBI", South China Population, 4th Issue, 2013.

Descriptive results

Trends in SBI by year

China's SBI has experienced three stages: the long-term stability before 1990s, the constant rise in 1990-2005 and the slow decline since 2006.The mean SBI ranged from 2.6 to 2.8 years from 1970 to 1985 and leveled at around 3 years in late 1980s. In early 1990s, it instantly rose from 3.05 years in 1990 to 7 years in 2005 and gradually declined slowly since 2006 (see Figure 2).

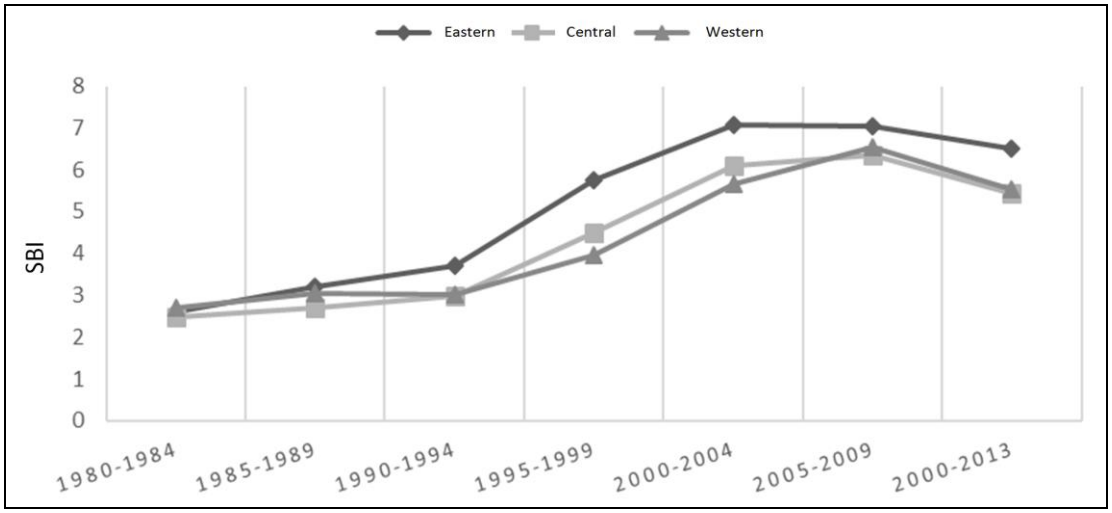
Figure 2 SBI in China since 1970



Source: Calculated based on the data of 2013 as reported by the 121-county population monitoring system.

Trends in SBI by region. Eastern, central and western regions show basically similar variation trends of average SBI, all undergoing the universal rise before 2005 and the gradual fall after 2009. On the whole, eastern region features the highest SBI, indicating that in places with higher level of socio-economic development, people tend to postpone the second birth (see Figure 3).

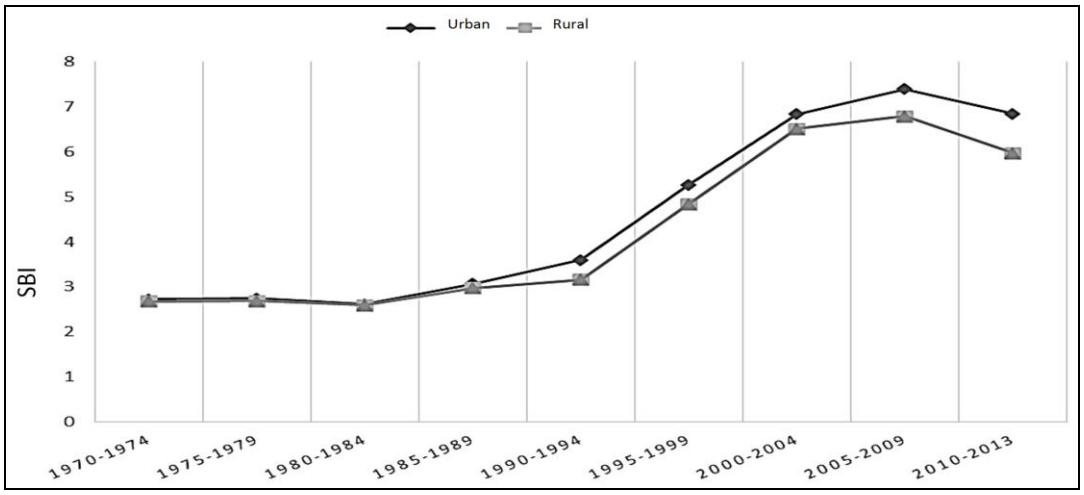
Figure 3 SBI in China since 1970 by Region



Source: Calculated based on the data of 2013 as reported by the 121-county population monitoring system.

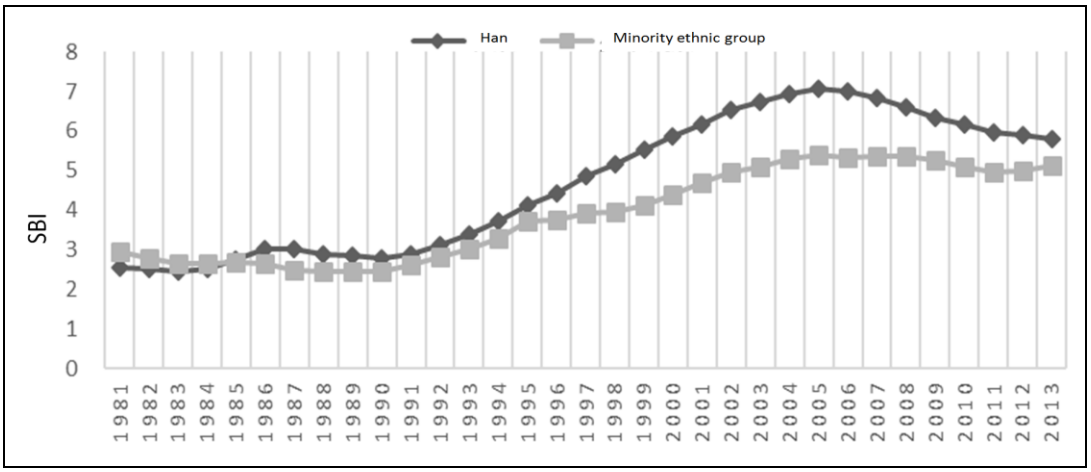
Trends in SBI by area. Before the roll-out of birth spacing policy, the variation trends of SBI in either urban area or rural area remained identical and showed minor difference during the 20 years from 1970 to 1990, all falling below 3 years. From 1990 and then on, the difference in birth interval emerged between urban and rural areas and kept at around 6 months after 1995. Such difference gradually broadened after 2005 and stabilized at around 1 year after 2010 (see Figure 4), showing that reproductive-age women in urban areas tend to postpone the second birth under the relativley more rigid fertility policy and second birth spacing rule and due to the delay in urban education and the pressure from employment.

Figure 4 SBI in China since 1970 by Area (Urban/Rural)



Trends in SBI by ethnic group. Compared with Han, minorities are blessed with loose fertility policy and SBI. For example, according to the family planning regulations of Yunnan, Inner Mongolia and Guangxi, reproductive-age Han residents who are eligible to have a second child must submit to the birth spacing of 4 years, while it's only 3 years for minorities. Before 1993, the SBI of both Han and minority residents all fell below 3 years. From then on, the SBI of Han residents gradually went up to 7 years till 2006, after which it started to decline. The SBI of minority residents inched up slowly to the peak of 5 years, at which it became stabilized (see Figure 5).

Figure 5 SBI in China since 1970 by Ethnic Group



Impacts of birth spacing policy on SBI

Amid the study of SBI in rural areas, Guo Zhigang and Li Jianzhao (2006) pointed out that the provisions on the number of births and birth spacing as contained in the local fertility policies as well as the firmness of law enforcement will have major impacts on the SBI. However, due to the limitations in National Family Planning/Reproductive Health Survey data in 2001, they failed to carry out the corresponding analysis whilst utilizing the data from. This section will focus on discussing the impacts of changing birth spacing policy on the SBI. It's important to note that fertility behavior is a complicated personal decision which is not only restricted by the macroscopic fertility policy and the birth spacing requirement, but is also affected by the birth cohort to which the reproductive-age individual belongs and his/her own age. Here, we will dig into the connections between the dynamic variations in birth spacing policy and the variations in SBI, whilst the SBI analysis based on the birth cohort of reproductive-age women will be discussed separately.

Introduction, adjustment and abolishment of birth spacing policy

Through birth spacing policy to lower fertility is one of the important components of China's family planning policy. Guangdong Province took the lead in setting forth explicit birth spacing requirements in its provincial family planning regulations in 1980, followed by other provinces. All provinces had set birth spacing requirements until 1992 (see Table 3). The provincial birth spacing policies revised once and more times in according to the national law modification and local realities, and the requirements for birth spacing have been loosened gradually over time. 23 provinces have abolished birth spacing requirements until 2014 while 8 provinces did not.

Table 3 Cumulative Number of Provinces Implementing Second Birth Spacing since 1980

Year	Number	Year	Number	Year	Number	Year	Number
1980	1	1989	17	1998	31	2007	24
1981	5	1990	25	1999	31	2008	23
1982	5	1991	27	2000	31	2009	17
1983	5	1992	28	2001	31	2010	17
1984	5	1993	30	2002	30	2011	16
1985	5	1994	30	2003	29	2012	14
1986	6	1995	30	2004	28	2013	13
1987	6	1996	30	2005	28	2014	7
1988	14	1997	30	2006	26		

Note: The collation of birth spacing policies was based on the provisional family planning rules or family planning regulations of 31 provinces (municipalities/regions), whilst the year shall be subject to the official implementation year of the corresponding rules/regulations.

The three types of birth spacing regulation include: 1) only setting requirement for minimum legal length of SBI, which is 4 years in most of the provinces, 3 years in Anhui, Jilin, Tibet and Xinjiang and 5 years in Gansu, Hubei and Jiangxi;; 2) only setting requirement for minimum legal age for second birth, such as 27 in Jiangsu, 28 in Liaoning and 30 in Shandong; 3) dual requirements for minimum legal length of birth interval and minimum legal age for second birth, such as Hebei, Henan and Hunan, all requesting that the woman must reach the age of 28 in order to give birth to the second child, and the interval with first birth must reach 4 years.

Respective provinces have also prescribed certain special cases which can be exempted from birth spacing or which can have the SBI shortened, including age, first birth of remarried woman, minorities, disability of first child, or the couple being minority living in the border area. For example, Beijing Municipality prescribes that any woman can be exempt from second birth spacing after the age of 28; Hebei Province stipulated that any woman above the age of 30 can enjoy shortened birth interval; Tianjin Municipality prescribed that birth spacing doesn't apply to the first birth of remarried women or those who are above the age of 30 and get pregnant after adopting a child due to diagnosed infertility.

Except for Beijing, all other provinces have made one or multiple adjustments to the birth spacing, showing a general trend of the gradual loosening of birth spacing, which has become the consensus of most provinces. As of December 2014, 23 out of 31 provinces (municipalities/regions) have abolished birth spacing, yet it hasn't been terminated in Beijing, Tianjin, Hebei, Chongqing, Sichuan, Yunnan, Jiangsu and Tibet (see Table 5).

Impacts of the birth spacing policy on the variations in SBI by period

From Figure 6, we can see that the dynamic variations in China's birth spacing policy accords with the overall variation trends of the SBI.

(1) Although family planning has been put into implementation before 1980, the fertility policy was comparatively loose and no province has set forth specific birth spacing requirements. The average SBI was below 2.7 years across the country.

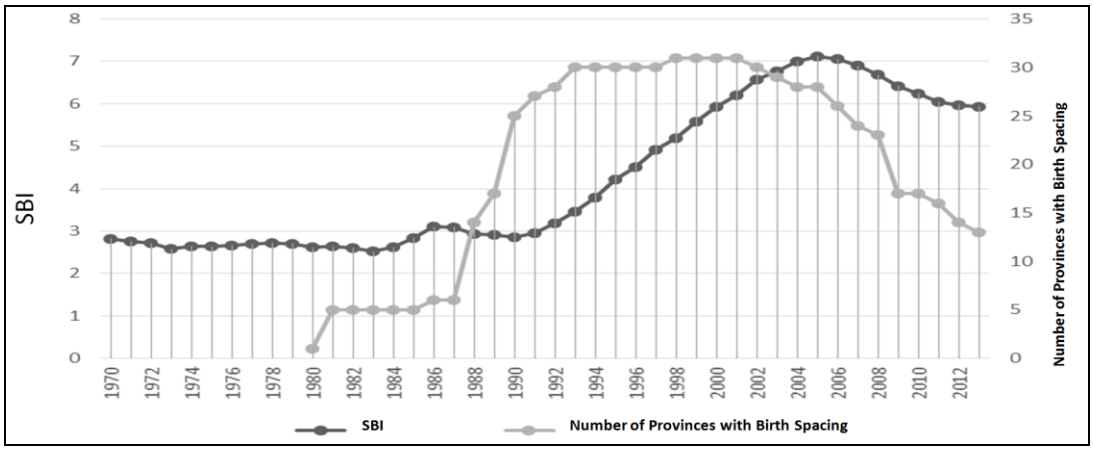
(2) With the release of "Open Letter" in early 1980s as well as the roll-out of local family planning regulations following the lead of Regulations of Guangdong Province on Family Planning in 1980, the curtain of setting forth specific birth spacing in the family planning policy was raised. Still, since only 6 provinces provided for birth spacing before 1988, the SBI kept around 3 years and increased slowly in 1980-1990.

(3) In 1992, almost every province passed new legislation on birth spacing, leading to the gradual increase in SBI, which extended from 3.05 years in 1990 to 7.12 years in 2005. This shows that rigid fertility behavior control and firm enforcement of family planning policy have contributed to the extension of SBI.

(4) The SBI began to drop slowly from 2006. After the promulgation of the Law of the People's Republic of China on Population and Family Planning in 2002, respective provinces successively abolished the birth spacing in the new round of amendments to the local population and family planning regulations. An overwhelming majority of provinces have loosened the birth spacing requirements to different extents since 2002, including shortened birth spacing and lowered age for second birth. Provinces like Jilin and Hainan even abolished the birth spacing. Although Jilin, Hainan, Shanghai and Jiangsu have successively revoked birth spacing since 2002, the transition

took place only after 2005 due to the time-lag effect of policy. With more and more provinces terminating birth spacing, the downward trend of SBI got more and more obvious across the country (see Figure 6).

Figure 6 Variations in SBI and Provinces Establishing Birth Spacing by Year

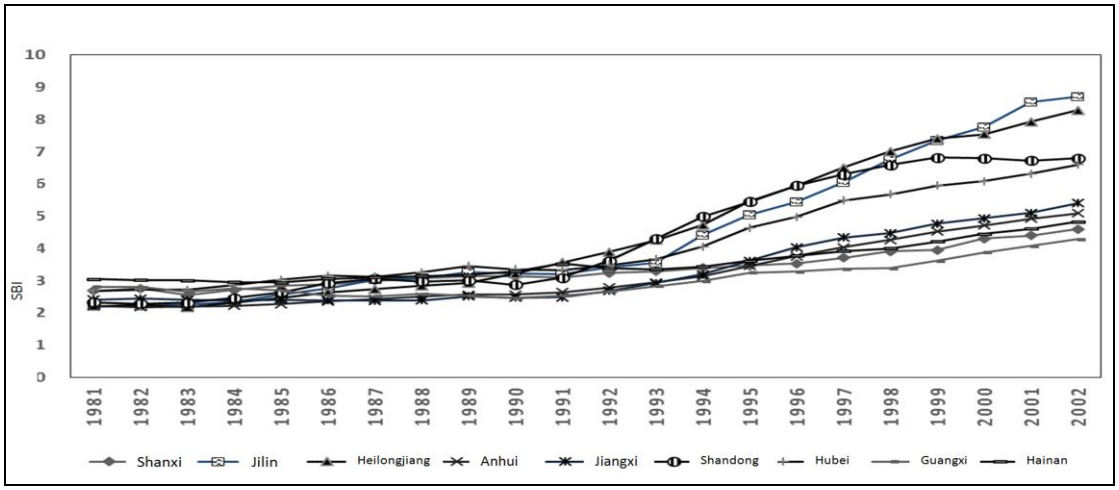


Source: Calculated based on the data of 2013 as reported by the 121-county population monitoring system of the former National Population and Family Planning Commission.
Note: The collation of birth spacing policies was based on the provisional family planning rules or family planning regulations of 31 provinces (municipalities/regions), whilst the year shall be subject to the official implementation year of the corresponding rules/regulations.

SBI before and after the introduction, adjustment and abolishment of birth spacing [6]

By comparing the average SBI of respective provinces before and after the introduction of birth spacing, it's found that: (1) Before birth spacing was introduced, there was slight difference among provinces in terms of SBI; (2) the introduction of birth spacing in each province in later 1980s and early 1990s, universally and evidently prolonged the SBI (see Figure 7).

Figure 7 SBI before and after the Introduction of Birth Spacing Policy



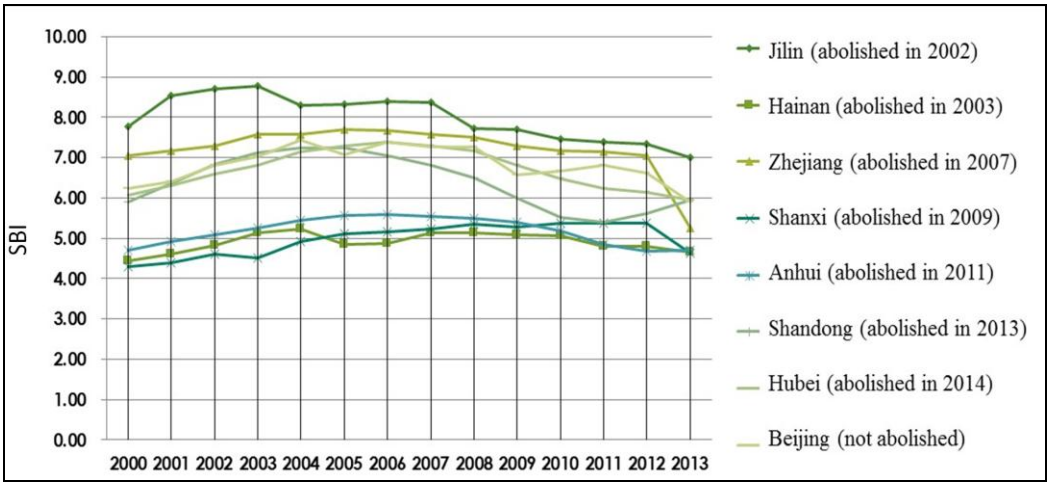
Source: Calculated based on the data of 2013 as reported by the 121-county population monitoring system of the former National Population and Family Planning Commission.

[6] Note: Only provinces with over 1000 second births per year were selected.

The effect of abolishing birth spacing policy is examined in related provinces by comparing the SBI of respective provinces in different periods. For instance, the down trend of SBI appeared after years of abolishing the spacing policy in Jilin, Hainan, and Zhejiang; however, the same trends also has been noticed in the provinces of Hubei, Anhui and Beijing before birth spacing abolishing policies(see Figure 8 and Table 4), indicating that the decline of birth interval has become an inexorable trend.

At the same time, it's important to note that in provinces which have abolished birth spacing and seen the decline in SBI, the actual SBI among reproductive-age women is still higher than the statutory 4 years applicable before. This shows that reproductive-age women have shifted from the passive postponement to the active postponement of second birth, and yet apart from the policy factor, there are also other complicated factors affecting people's fertility behaviors.

Figure 8 Changes in SBI of the Provinces Since 2000



Source: Calculated based on the data of 2013 as reported by the 121-county population monitoring system.

Table4 Year for SBI Starting to Decline and for Abolishing Birth Spacing requirements in Some Provinces

Province	Year for Birth Interval Starting To Decline	Year for Abolishing Birth Spacing Policy	Province	Year for Birth Interval Starting to Decline	Year for Abolishing Birth Spacing Policy
Jilin	2004	2002	Guangxi	2009	2012
Hainan	2005	2003	Liaoning	2006	2014
Hubei	2007	2009	Henan	2006	2014
Shaanxi	2007	2009	Heilongjiang	2006	2014
Guizhou	2009	2009	Shandong	2005	2014
Jiangxi	2007	2009	Beijing	2005	Not abolished
Shanxi	2009	2009	Sichuan	2007	Not abolished
Anhui	2007	2011	Jiangsu	2007	Not abolished

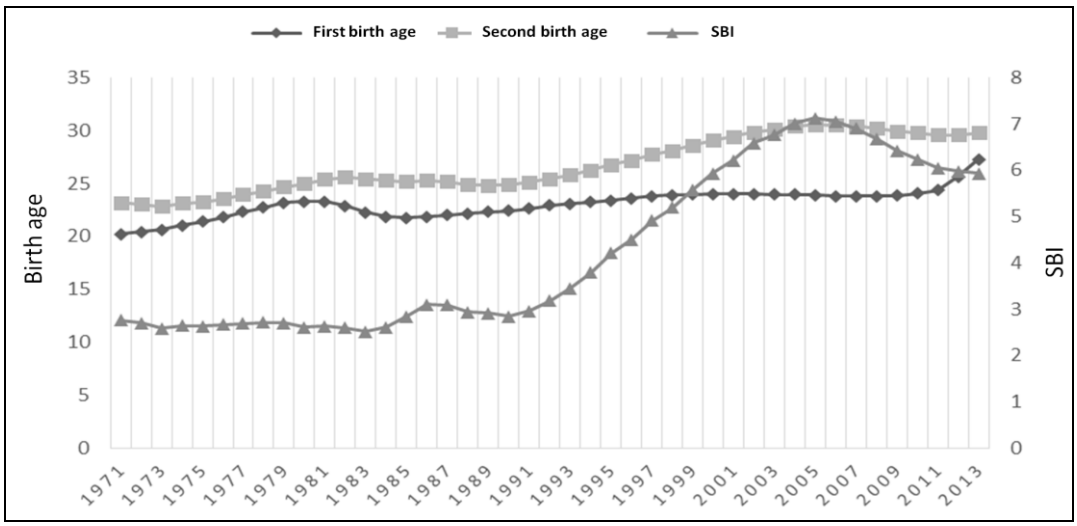
Note: Only the provinces annual numbers of second birth over 1000 are selected.

Source: Calculated based on the data of 2013 as reported by the 121-county population monitoring system.

Note: The collation of birth spacing policies was based on the family planning regulations of 30 provinces (municipalities/regions, excluding Tibet), whilst the year shall be subject to the official implementation year of the corresponding rules/regulations.

To further understand the variations in China's SBI, we have also incorporated the age of first birth and the age of second birth since 1970 into our analysis. Apart from the correlation with the birth spacing policy, the consecutive decline in SBI in recent years is also closely connected with the rise in the age of first birth and the slow decline in the age of second birth (see Figure 9). Late marriage and late childbirth are more common in both urban and rural areas, and emerge under the background of postponed first birth (Guo Zhigang, 2013; Xu Xing, 2013). The shortened SBI is more likely indicative of the compensation for the late first birth.

Figure 9 Changes in Age of First and Second Births and SBI Since 1970



Source: Calculated based on the data of 2013 as reported by the 121-county population monitoring system.

Conclusions and Suggestions

This study describes the trend of SBI in China since 1970s using the population monitoring data in 121 Chinese counties and conducts a deep analysis for the impact of birth spacing policies on the SBI in China, especially for the year after 2000 and is unique given the introduction of the impact of the effects of birth spacing policy on the SBI in China. The analysis of SBI based on the population monitoring data of 121 counties has provided a new empirical data, unveiling the evolvement and multi-dimensional differences of China's SBI. We show that:

(1) The birth spacing policy plays a historical role in regulating the people's fertility behaviors and reducing the population growth. Birth spacing policies increase the SBI in China. As more and more provinces set the birth spacing, the rising trend of the SBI becomes increasingly significant. The second child interval gradually declined since 2005 as a result of the alternation or cancellation of birth spacing policies. As more provinces terminate these policies, the downward trend is more significant.

(2) The abolishment of birth spacing was subject to a time-lag effect in reducing the actual birth interval. Respective provinces have seen the policy effect after abolishing the birth spacing. For example, Jilin and Zhejiang saw the decline in SBI a few years after abolishing birth spacing, and yet the drop in birth interval before cancelling birth spacing have already witnessed, indicating that the decline of birth interval has become an inexorable trend before the roll-out of the universal two-child policy.

(3) By further analyzing the age of first birth and the age of second birth, it's found that the consecutive decline in SBI in recent years is the joint outcome of the rise in the age of first birth and the slow decline in the age of second birth. Late marriage and late childbirth are quite common in both urban and rural areas. In particular, under the background of increasingly late first birth, people tend to shorten the birth interval. The shortened SBI is more likely indicative of the compensation for the late first birth. Meanwhile, in provinces which have already abolished birth spacing, the actual SBI among reproductive-age women is still higher than the statutory 4 years applicable before. This shows that, apart from the policy factor, there are also other complicated factors affecting people's fertility behaviors, and the national fertility policy and birth spacing is posing increasingly weaker influence on people's fertility attitude and behavior.

(4) The SBI is presenting evident differences in area (rural/urban), ethic group and region, as well as individual differences. The SBI among reproductive-age women residing in urban areas, of Han ethnic group, living in eastern region or boasting higher level of education is higher than the corresponding control groups, showing that reproductive-age women in urban areas tend to postpone the second birth under the relatively more rigid population policy and second birth spacing rule and due to the delay in urban education and the pressure from employment. In places with higher level of socio-economic development, people are more likely to postpone the second birth.

(5) As an important part of the population policy advocating "later birth, longer interval and less children ", the birth spacing rules were rolled out to curb the then prevailing "early birth, short interval and more children" fertility pattern. Under the general background of late marriage and late childbirth in either urban or rural areas, it's not advisable to continue the birth spacing policy. Terminating birth spacing not only reflects the human orientation of population policy, but also shows full respect to the rational and autonomous choice of reproductive-age population and contributes to their physical and mental health.

Table 5 Provinces Continuing the Birth Spacing Policy until 2014 and the Requirements Therein

Birth Spacing Requirements	Province
Birth interval no less than 4 years or the age of woman no younger than 28	Beijing, Tianjin
The interval from first birth must be 4 years, and the woman must reach the age of 30, except for the first birth of remarried women or those who get pregnant after adopting a child due to diagnosed infertility.	Sichuan
The interval from first birth must be 3 years, unless the woman has reached the age of 28	Chongqing
The interval from first birth must be at least 4 years, which can be shortened to 3 years in exceptional circumstances	Yunnan
The interval from first birth must be 4 years, and the woman must reach the age of 26	Hebei
The interval from first birth must be 3 years, unless the woman has reached the age of 35	Tibet
The woman has reached the age of 24	Jiangsu

Note: This table is based on the population and family planning regulations of respective provinces (municipalities/regions) as of 2014.

At present, among the 8 provinces (municipalities/regions) in which birth spacing haven't been abolished, only Jiangsu set forth a comparatively young minimum age (24 years old for woman) for second birth, whilst the birth spacing policy in other provinces (municipalities/regions) still advocates late marriage, late childbirth and long birth interval (see Table 5). This might jeopardize the second birth of women who are no longer young and threaten their physical and mental health. Therefore, all these provinces are suggested to make proper adjustments to the birth spacing rules in the new round of amendments to the family planning regulations and clear up the impacts of excessively long or short birth spacing on the health of new-born population by lowering the minimum age for second birth or shortening the interval from first birth. As certain areas where the fertility pattern characterized by "early, thick and more" still prevails, the birth spacing rules can be prescribed properly to reduce cases of early and thick childbirths and guarantee the health of reproductive-age women and newborns.

Appropriate birth spacing is beneficial to maternal and child health, growth of children and the improvement of family status. Empirical studies on medicine also prove that excessively long or short birth interval might lead to adverse maternal and child outcomes (Howard, 2013; Amanda, 2012; Du, 2015). Meanwhile, it's foreseeable that long-interval childbirth will turn out a noteworthy fertility pattern in the recent course of China's population development with the fertility boom contributed by the post-70s generation who are still at the reproductive age. Concerns over birth spacing must be considered in the policy framework on its impacts on population health. It's suggested to start with assuring population health, underline the impacts of birth spacing on maternal and child health and population quality, advocate the optimal birth interval of 2-3 years, pay focused attention to the needs of couples favoring excessively long birth interval in the face of the "Universal Two-Child Policy", and provide the corresponding public administration and services.

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