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REVIEW

The Influence of the Two-child Policy on Urbanization in China

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ABSTRACT

Family planning has been China's basic national policy since 1980, but it changed from a one-child policy to a two-child policy at the end of 2015 as which will further stimulate the rapid growth of China's population and have a profound impact on the population structure and land use in China. Based on the forecast of total population change in national and provincial dimensions after the two -child policy, the paper forecasted the spatial pattern of China's population and provincial differentiation over the next 15 years, and discussed the far-reaching impact on the future urban and rural land use and planning. Conclusions as follows: the two-child policy will achieve rapid population growth in the next 5 years, then there will be a stable growth phase; the peak of China's population increase will occur in 2030 with a total population of about 1.55 billion people, which will continue the regional differentiation of urbanization, and urbanization level in southeastern region will remain generally higher than that of the northwest. In addition, population growth brings new demands in urban and rural construction land, therefore, more intensive use of land will be the inevitable choice for the future development for China.

1. Introduction

China is the world's most populous country, its population policy is related to the overall situation of national development. It will have a profound influence on global demographic change, global industrial distribution and economic growth. Looking back at the history of population policy in China, China's population growth rate reached 20% in the 1960s, and there was a major contradiction between population expansion and lack of food and education resources. So in the 1970s, the government had implemented various policies to limit the population growth, and lastly, "the one child policy" was applied as the national policy to control population growth which was applies to urban residents strictly. And for rural residents, they were allowed to have a second child if the first child is a girl. The policy lasted more than 30 years until the beginning of the 21st century, when China's population development has been marked by declining birth rates, shrinking labor force and aging population, so China began its full implementation of the two-child policy

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instead of the one-child policy in 2015. However, facing the increasing cost of living and education, the concept of people in childbearing age has changed a lot, they may not be willing to have more children even if they are allowed to, and may also change their preferences from the "quantity of children" to the "quality of children". In the development of such situation, there is no doubt that predicting future changes about China's population in a period of time not only help government to identify the profound influence of Chinese residents' structure and its urbanization effect but also can provide scientific reference for the corresponding policy recommendations to face the uncertainty of China's population development in future.

China's population policy has been a hot topic since the implementation of China's the one-child policy, there have been extensive researches on China's population structure change and its development policies. For example, Liang (1979)[1] concerned about strategies of population and development in China and propose an alternative policy of "two children plus spacing". Song(1981)[2] proposed limiting population growth based on optimal population size. Meanwhile, other people discussed the potential demographic effects of the one-child policy. They thought the policy caused some serious social and economic problems[3], such as employment, food supply and social welfare[4-6], especially had an impact on women and the patriarchal family in China[7]. A two-child policy with spacing was paid more attention[8]. Zeng and Vaupel have a continuous research on Chinese population policy[9], and they thought "two children and late childbearing" was the best alternative to avoid both too large population and severe problems of population aging in the future. Some scholars supported this opinion[10] reached a similar conclusion. Then some suggestions were proposed to adjust the current fertility policy to the two-child policy[11].

The one-child policy has changed the traditional Chinese family organization structure, the production and consumption mode and the residential land structure, then produce the indirect influence on urbanization in material supply, environmental load change and other aspects. Urbanization is a phenomenon that reflects the changes of population migration from rural settlements to concentrated urban area, and the changes of social life style from agricultural production to industrial and service activities[12]. Obviously, demographic change by the childbearing policy has a huge impact on urbanization. In the process of urbanization in China, the industrialization process of the eastern coastal open area attracts a large number of migrant workers from other regions. So, the two-child policy will also affect China and even the world's demographic change and urbanization again. Future urbanization will continue to pose serious challenges to China's population policy-makers[13]. Simulations of China's population growth and aging may yield constructive insights for policy analyses[9]. It would be rational for China to modify its current population policy and to relax the rigid control on childbearing sooner rather than later, and to allow the total fertility rate (Shorthand for TFR) to grow and be maintained at around 1.8 in the near future [14]. There is a clear need to analyze more closely the interrelationship between future population growth and urbanization, and population policy change to the two-child policy unquestionably is an important factor which needs to be paid more attention now. The best-known dimension is to study the demography that deals with numbers of people and their general characteristics, with urban growth rates and their components [15].

This paper, based on China's current census data, reproductive expectations investigation and other data, completed the forecast of China's population growth rate in the next 15 years. And next we analyzed the changes in regional population differences at the provincial level. Finally, we were proposed some targeted measures and suggestions to promote the sustainable development among population, resources and environment by analyzing demographic changes of urbanization and the impact of urban and rural land use in different areas.

2. Data and Methodology

2.1 Data Sources

In this paper, the basic data are mainly from the China census data 2010, provinces and autonomous regions Census data 2010, as well as the China Statistical Yearbook (2011-2015) and the provinces and autonomous regions' Statistical Yearbook (2011-2015) .

In addition, the paper also made reference to "national reproductive expectations" data in 29 provinces and autonomous regions (not including Tibet and Xinjiang) made in August 2013 by China Population and Development Research Centre. In addition, the paper also made reference to "national reproductive expectations" data in 29 provinces and autonomous regions (not including Tibet and Xinjiang) made in August 2013 by China Population and Development Research Centre. The survey object is the fertility intentions of the residents in streets, villages and towns in 29 provinces (autonomous regions and municipalities) in mainland China. A total of 250,000 Chinese female aged 15 to 60 were investigated. The main purpose of the survey is to understand the fertility intention and the changing trend of fertility. This result is obtained by a nationwide survey, so it is scientific and representative.

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2.2 Methodology and Principles

Currently, there are many methods and models to forecast population, including mathematical models of Logistic regression, Leslie matrix, Gray system forecasting method techniques[16]. The cohort-component method based on the factors of population itself changes and demographic principles[17,18], as well as social and economic model methods through the associated population growth and economic development[19,20]. Each has its advantages and disadvantages. Among them, the cohort-component method is capable of binding to population changes and demographic factors by the queue age data queue, to get a more accurate population forecast value[21], which is generally recognized academically[22]. Therefore, this paper adopted the cohort-component method to forecast the whole population in China and analyzed the trends of the total population and age structure.

In the forecasting process, we do not account for the impact of population migration and other factors. Because in the early stage of the industrialization process in China, population migration is the main influencing factor. Most of the children of the first-generation migrant workers remain in the city, and the future Chinese household registration system will be open to these people. Therefore, industry migration of population migration will gradually stabilize.

The algorithm works are as follows[23].

First, we should calculate and forecast the population to the future from the initial population according to different ages:

$$P_{x+1}^{t} = P_{x}^{t} \cdot (1 - D_x) \quad (1)$$

$$P^{t} = \sum_{x=0}^{120} P_{x+1}^{t} \quad (2)$$

Among them, P_{x+1}^{t} is the population number at the age of x+1 in the year t, P_{x}^{t} is the population number at the age of x in the year t, D_x is the death probability from the age x to the age x+1, P_t is the total population of different age groups (except age 0).

Next, the annual numbers of births are calculated:

$$B^{t} = \sum_{x=15}^{49} (f_x \cdot W_x) \quad (3)$$

Among them, B^t is the number of births in the year t, f_x is age-specific fertility rate, W_x is the number of women of childbearing age by age.

According to the above, the annual total fertility rate can be further deduced[24]:

$$B^{t} = \sum_{x=15}^{49} (f_x \cdot W_x) = \sum_{x=15}^{49} (\beta \cdot h_x \cdot W_x) = \beta \cdot K \quad (4)$$

$$\text{And } K = \sum_{x=15}^{49} (h_x \cdot W_x) \quad (5)$$

Among them, β is the annual total fertility rate, h_x is the standardized fertility rate by age, K can be calculated and drawn based on the 2010 census. If we assume the K unchanged in recent years, the annual number of births is known as B^t , you can get an estimate of the total fertility rate β .

Then, we calculate the new born population in the future:

$$P_0^{t+1} = B^{t} \cdot (1 - D_0) \quad (6)$$

Among them, P_0^{t+1} is the number of the beginning in next year for the age 0, and D_0 is the death probability from the age 0 to age 1.

Finally, the population at the end of year t is calculated:

$$P = P^{t} + P_0^{t+1} \quad (7)$$

Among them, P is the gross population of the different age groups in the year t.

3. Forecast of Urbanization Rate

Introducing the concept of urban and rural population growth rate i, this paper refers to the calculation method of urbanization trends forecast used by Chun-liang Gao (2013)[25].This forecasts the urbanization rate of the whole country and of each province from 2015 to 2030 using the basic formula and urbanization rate model used by the United Nations, and is based on the 2010 national urbanization rate calculated by the 6th census data in China.

Urban and rural population growth rate is calculated as follows:

$$i_T = u_T - r_T \quad (8)$$

$$u = u_{t+1} - u_t \quad (9)$$

$$r = r_{t+1} - r_t \quad (10)$$

$$T = t + n \quad (11)$$

Among them, u and r mean urban and rural population growth rate respectively. T is the forecast year, t is the base year, n is the interval number of years. I is the rural and urban population ratio and UR is urbanization rate, U is urban population, R is rural population.

A function is established using urbanization rate, urban and rural population ratio and urban and rural population growth rates. The formula is as follows.

$$i = n^{-1} \ln(I_T / I_t) \quad (12)$$

$$I_T = I_t * e^{i*n} \quad (13)$$

$$UR_T = I_T/(I_T+1) \quad (14)$$

4. Results

4.1 Estimates of the Potential Fertility Population

After the two-child policy implementation, these potential fertility women number will increase sharply in the first few years, which will lead to an obvious increase in the number of new-born children and fertility rates. Therefore, it is a most important period for population growth

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forecast when childbearing willingness is released.

Using the National Census 2010 data, the number of married women from 20 to 44 in 2015 was estimated with the cohort-component method, and the result was 211.5 million (except Xinjiang and Tibet because of data deficiency). There are three points to highlight. Firstly, because of the National Fertility Survey does not include Xinjiang and Tibet, the forecast number of married women does not include these two regions in this paper. According to the international statistical practice, women of childbearing age are usually the cohort aged 15 to 49 years, but in China, the number of the married women under 20 years old (the age of marriage is not legal) and over 44 years old (belong to high-risk reproductive age) who would like to have a baby are few, so they are less affected by the two-child policy. This number is almost negligible. Moreover, the target population of the national fertility survey willingness is also focused on married women aged 20 to 44 years, so this age range is used in this paper.

Secondly, according to the National Fertility Survey data, the target population of those who want to have a second child was calculated----45.56% of its total married women (detailed calculation process refer to Xiaochun Qiao(2014) [24]), and the number is 96.36 million. Among them, about 48.1% of its total married women want to have a second child, and 13.6% of them are undecided[26]. Assuming that fertility results above, the women who want to have a second child were taken as a minimum estimate (accounting for 48.1%), the women who are undecided were taken as a maximum estimate (accounting for 61.7%), accordingly the lowest potential fertility population the range is from 46.32 million to 59.41million.

Finally, the two-child policy for one of the parents who is the only child was considered: this had been implemented from November, 2013 to the end of 2015. According to statistics from the National Health and Family Planning Commission of the PRC[27], there were nearly 2 million pairs of couples, one of whom was the only child had applied for a second child from January 2014 to December 2015. Therefore, it was estimated that the lowest population growth potential is 44.31 million and the highest is 57.4 million after two years of the two-child policy for a parent by the end of 2015.

4.2 Estimation of New Births and the Total Population from 2016 to 2019

The total potential fertility population will not have a second baby within one year after the two-child policy is introduced, but will gradually increase over a few years. Generally speaking, the average time interval is four years for Chinese women to have a second baby. Therefore, it is assumed that the potential fertility demand can be fully released in four years after the implementation of the two-child policy, and the proportion that will be released in the next 4 years is respectively 20%, 35%, 25% and 20%[28]. Thus upper and lower numbers of new born in the following 4 years from 2016 can be calculated. According to total population statistics from the China Statistical Yearbook, normal birth population is assumed to be 17 million all over the country each year. Adding the newborn population due to the two-child policy, the upper and lower limits of the total population during the next four years can be obtained. Then according to the total amount of annual births, total fertility rates can be estimated for the next four years. As shown in table 1., newly-born population, total number of births and total fertility rate from 2016 to 2019 can be calculated. It can be seen that total number of births has an obvious increase in the next 4 years after the implementation of the two-child policy. The total number of births will reach its peak in 2017, remains from 32.51 to 37.09 million. The total fertility rate increased drastically in 2016 compared with 2015 level, ranging from 2.57 to 2.84. It peaks around 3.24 to 3.69 in2017, and declines to the same level in 2019 as in 2016.

Table 1. Estimation of newly-born population, total births and total fertility rate from 2016 to 2019

Estimation Index	2016 Distribution ratio 20%	2017 Distribution ratio 35%	2018 Distribution ratio 25%	2019 Distribution ratio 20%
Birth increment（million）				
Lower limit	8.86	15.51	11.08	8.86
Upper limit	11.48	20.09	14.35	11.48
Mean	10.17	17.80	12.72	10.17
Total Birth（million）				
Lower limit	25.86	32.51	28.08	25.86
Upper limit	28.48	37.09	31.35	28.48
Mean	27.17	34.80	29.72	27.17
Total Fertility Rate				
Lower limit	2.57	3.24	2.79	2.57
Upper limit	2.84	3.69	3.12	2.84
Mean	2.71	3.46	2.96	2.71

4.3 Total Population Forecast from 2016 to 2030

With the release rates of the cumulative potential fertility population in the following 4 years, there would be an increase in the number of births and total fertility rate after the implementation of the two-child policy, and then it would reduce to a stable rate. Therefore, the total popu-

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lation forecast over future 15 years needs two steps. In the first step, the total population from 2016 to 2019 was forecast. According to the results in table1, newly-born population is known, and the total population from 2016 to 2019 can be obtained through age shift and the cohort-component method. In the second step, the total population from 2020 to 2030 was forecasted. From 2020, due to the release of the historical accumulation of fertility demand, the national women's fertility rates will stabilize. As for an accurate estimate of the total fertility rate, there is no uniform conclusion. Some scholars believe that the total fertility rate will be around 1.8, and others think it will reach about 2.0. The national statistically ideal number of children is 1.93 in 2020 and beyond, so we take this as the total fertility rate from 2020 to 2030. Based on the results of the total fertility rate, the number of births can be estimated in the year using the cohort-component method, and thus the total population can be estimated in future years. In addition, since the method used herein is suitable for short- and medium-term forecasts, and as there will be greater error for long-term forecasts, the period of forecast is from 2016 to 2030. The results of total population are shown in table 2 below.

Table 2. Forecasts of Chinese total population after a transition to a universal two-child policy (2016-2030)

year	Total population(billion)		
	Lower limit	Upper limit	mean
2016	1.3906	1.3933	1.3919
2017	1.4135	1.4207	1.4171
2018	1.4316	1.4420	1.4368
2019	1.4471	1.4601	1.4536
2020	1.4558	1.4688	1.4623
2021	1.4641	1.4772	1.4707
2022	1.4722	1.4852	1.4787
2023	1.4798	1.4928	1.4863
2024	1.4871	1.5001	1.4936
2025	1.4940	1.5070	1.5005
2026	1.5005	1.5135	1.5070
2027	1.5066	1.5196	1.5131
2028	1.5123	1.5253	1.5188
2029	1.5176	1.5306	1.5241
2030	1.5225	1.5355	1.5290

4.4 Urbanization Rate Forecast from 2016 to 2030

Taking the national urbanization rate from 1978 to 2010 as reference data, the national urbanization rate from 2016 to 2030 is calculated using the method of urban and rural population growth mentioned above. The calculation steps are as follows: Firstly, urban and rural population growth rates (u and r) were calculated according to the data from1978 to 2010, then the actual urban and rural population growth rates (i_1) was calculated according to the formula. Secondly, urban and rural population growth rate in theory was calculated according to the formula i=0.037623-0.02604*UR, which was used in World Urbanization Prospects（2003）[29]. Thirdly, an average growth rate of urban and rural population was calculated in this paper $i=0.8* i_1+0.2* i_2$, referring to weight assignments obtained by Chunliang Gao(2013) [25] between the actual urban and rural population growth rate and that in theory. Fourthly, the proportion of urban and rural dwellers from 2016-2030 was forecast according to a function of the proportion of urban and rural dwellers and urban and rural population growth rate. Year n is from 1 to15. Urbanization rates from 2016 to 2030 based on urban and rural population ratios can be obtained. Finally, national urbanization rates from 2016 to 2030 were obtained according to the formula, and the final results are shown in Table 3.

Table 3. Forecasts of urbanization rate after a transition of two-child policy

The results of national urbanization rate from 2016 to 2030		
	I	UR
2016	1.2692	0.5593
2017	1.3303	0.5709
2018	1.3944	0.5824
2019	1.4615	0.5937
2020	1.5319	0.6050
2021	1.6056	0.6162
2022	1.6829	0.6273
2023	1.7639	0.6382
2024	1.8489	0.6490
2025	1.9379	0.6596
2026	2.0312	0.6701
2027	2.1290	0.6804
2028	2.2314	0.6905
2029	2.3389	0.7005
2030	2.4515	0.7103

4.5 Effect of the Two-child Policy on China's Total Population

From the above analysis, we can see that the two-child policy would result in a sharp increase in total fertility rate and newly-born population, thus affecting the size of the total population in China in recent years. As shown in Table 2, China's total population would increase rapidly, ranging from 1.4558 billion minimum to 1.4688 billion for the upper estimation. Therefore, the mean total population

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would be 1.4623 billion in 2020. By 2030, the lowest total population is estimated at 1.5225 billion and the highest is estimated at 1.5355 billion, and the mean total population is 1.529 billion. As for population growth rate, it was only 6.1 ‰ from 2010 to 2015 before the two-child policy. After the two-child policy implemented, the average population growth rate is 12.5‰ from 2015 to 2020, 5.2‰ from 2020 to 2025, 3.8‰ from 2025 to 2030. The average population growth rate is 7.2‰ from 2015 to 2030, which is 1.1‰ faster as compared with recent 5 years. As can be seen, the population growth rate in China presents a rule of "increase rapidly initially and then decline rapidly" after the implementation of the two-child policy.

The future trend of keeping the one-child policy was simulated using the cohort- component method, then it was compared to the population increase estimation when it changed to the two-child policy(Figure 1). As can be seen from Figure 1, we can find that if the one-child policy was unchanged, China's total population would continue to increase during 2030, but the growth rate and scope would gradually slow down, and the total population in 2020 would be 1.4093 billion, and it would be 14.523 million by 2030. If the two-child policy begins to take effect, the population growth trajectory would change significantly. Under the two-child policy, the total population would be 1.4623 billion by 2020, which is 53 million more than keeping the one-child policy unchanged. It would be 1.529 billion by 2030, which is 76.7 million more than the policy unchanged. Therefore, there are significant differences between the two policies. From the viewpoint of the population trend, if the one-child policy was unchanged, China would enter a period of negative population growth soon after 2030. With the two-child policy, the reduction of total population can be effectively delayed. In terms of adverse effects, the additional population after the two-child policy would consume more resources and generate greater demand on employment, infrastructure and public service facilities. This should be an important factor that must be considered in the future.

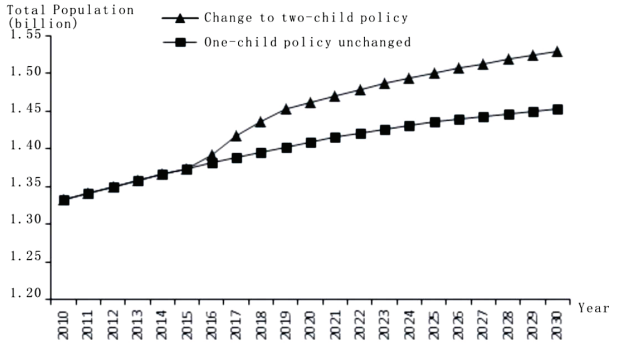

Figure1. Projected population trends in China to 2030

At the same time, according to national statistics, it is worth noting that the total population of China in 2017 was 1.39 billion, which is a gap of 22.35 million compared with the lowest forecast of 1,41.35 million in the same year. Combined with Chinese current national conditions, it is not difficult to see that the reason why the population does not reach the expected number is mainly the following: Firstly, women over the age of 35 who have a strong desire to have two children are not yet ready to have the second child till now, mainly due to physical reasons or work pressure. Around me, there are many women over 35 who are nurturing their bodies to prepare for having the second child. Some need one or two years to do so. Secondly, the "only child" who is the main force of birth now has adapted to the living environment of the only child and believes that it is good enough to have a child owing to the one-child policy has been in existence for nearly 40 years. Finally, not only the high cost of living, education and rent but also support their old parents gives "only child" the high pressure to have a second child since China has entered an aging society. All the huge pressures have made them unbearable, so there is no idea of having another child. In our opinion, the last reason is the most important. However, after China achieves the goal of building a well-off society in an all-round way by 2020, I believe that this situation will improve. The reduction in life stress will make more and more "only child" family want a second child.

4.6 Provincial Differentiations

The provincial population can be forecasted respectively for both the one-child policy and the two-child policies. Except for Xinjiang and Tibet, the remaining 29 provinces need to follow the three steps described above in the national population forecast. Based on these forecasts, population density maps were drawn in various provinces and municipalities in 2015, 2020, 2025 and 2030, which are several time nodes after the two-child policy (Figure 4). These maps reflect the provincial population evolution trends.

From a viewpoint of the changes of population density for different provinces during the next 15 years, the results showed that the highest density is distributed in the east region, high in the central region, a lower density in northeast region, and the lowest density in the western region with the two-child policy. The population densities of Shanghai, Beijing, Tianjin, Jiangsu in eastern coastal areas are the top 4, and the average population densities were 4146 people / km², 1386 people / km², 1350 people / km² and 838 people / km² respectively. Population densities in Beijing and Tianjin were similar at 1270 people / km²

and 1272 people / km² in 2015. But the population density in Beijing begins to exceed that of Tianjin from 2016, at 1470 people/km² and 1401 people/km² in 2030 respectively. Beijing ranked No. 2 in the provinces for population density from 2016. Population density in Shandong ranks top five until 2030 and is exceeded by Guangdong in that year. The population densities in the western provinces rank below 20, Gansu, Inner Mongolia, Xinjiang, Qinghai and Tibet ranks in the last five, and the average population densities are 63 people / km², 23 people / km², 15 people / km², 9 / km² and 3 / km² respectively. In general, the regional spatial pattern of China's population density is relatively stable, and the distribution pattern is such that more population is gathered in the southeast and relatively sparse in the northwest persistently over time.

For changes in the provincial population densities, there would be some impact on the population patterns on both sides of Hu Huanyong line[①] after the two-child policy. The population proportion in the southeastern part of Hu's line will increase, the opposite is that in the northwest side will correspondingly decline. It can be seen from Figure 2, the southeastern part of Hu Huanyong line population density continues to increase, while that in the northwest side has no significant change. Due to regional differences in former family planning policy, many minority and rural areas in the western region can have a second child or even more children. Therefore, the influence of the family planning policy in the western is smaller than that in many eastern and central regions, and potential reproductive accumulation amount is also smaller than many eastern and central regions. When the two-child policy was implemented, national fertility policy tends to be equal, and the policy has some impact on the cities in the western region, while it has a full range of impacts on both urban and rural areas in the eastern and central regions;

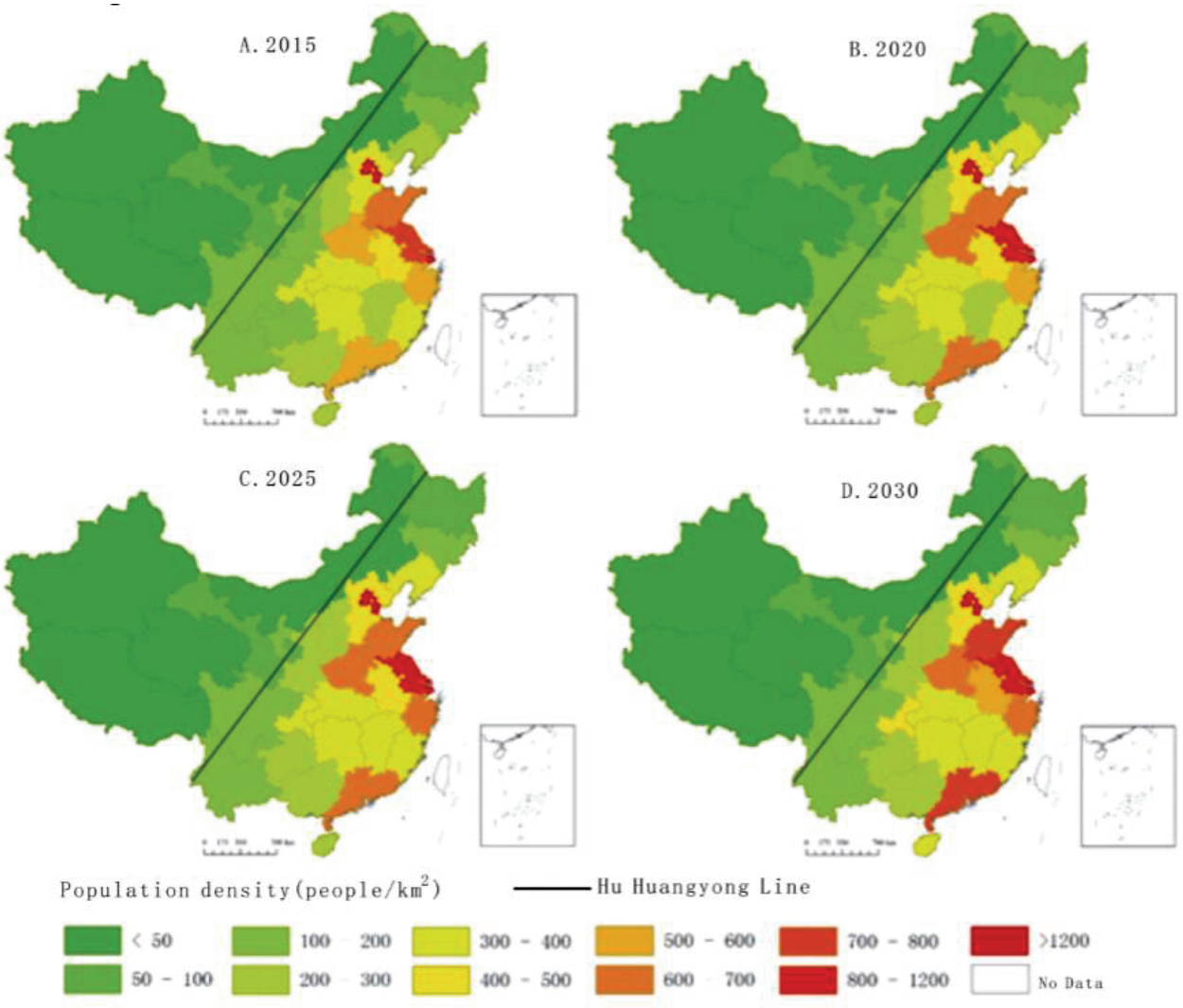

Figure 2. Evolution of population spatial patterns from 2015 to 2030

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4.7 Urbanization Regional Differentiation

The results show that urbanization rate would increase 1 percent every year from 2016 to 2030 in China, and the urbanization rates in 2020, 2025 and 2030 would be 60.50%, 65.96% and 71.03% respectively, which showed a steady increase process over the next 15 years. Urbanization rates in 31 provinces were calculated based on reference data from 2005 to 2014. Based on the urbanization rate in 2014, urbanization rates in 31 provinces were calculated for 2020, 2025, 2030. The method is similar to national forecast above. Results are shown below in table 4.

The Calculations show that urbanization rates in every province are rising in 2020, 2025 and 2030, especially in Beijing, Tianjin and Shanghai where would exceed 90%

Table 4. Forecasts of urbanization rates in different provinces after implementation of the two-child policy

Provinces or Autonomous region	i1	i2	i	I (2020)	UR (2020)	I (2025)	UR (2025)	I (2030)	UR (2030)
Beijing	0.0245	0.0151	0.0226	7.2465	0.8787	8.1152	0.8903	9.0879	0.9009
Tianjin	0.0492	0.0162	0.0426	5.9908	0.8570	7.4122	0.8811	9.1708	0.9017
Hebei	0.0535	0.0248	0.0477	1.2965	0.5646	1.6461	0.6221	2.0899	0.6764
Shanxi	0.0529	0.0236	0.0471	1.5439	0.6069	1.9535	0.6614	2.4718	0.7120
Inner Mongolia	0.0554	0.0221	0.0488	1.9693	0.6632	2.5131	0.7154	3.2071	0.7623
Liaoning	0.0397	0.0202	0.0358	2.5226	0.7161	3.0171	0.7511	3.6087	0.7830
Jilin	0.0102	0.0234	0.0129	1.3102	0.5671	1.3972	0.5828	1.4900	0.5984
Heilongjiang	0.0221	0.0225	0.0222	1.5781	0.6121	1.7630	0.6381	1.9697	0.6633
Shanghai	0.0058	0.0143	0.0075	9.0109	0.9001	9.3543	0.9034	9.7108	0.9066
Jiangsu	0.0675	0.0206	0.0581	2.6564	0.7265	3.5521	0.7803	4.7497	0.8261
Zhejiang	0.0417	0.0207	0.0375	2.3121	0.6981	2.7884	0.7360	3.3630	0.7708
Anhui	0.0629	0.0248	0.0553	1.3470	0.5739	1.7762	0.6398	2.3422	0.7008
Fujian	0.0564	0.0215	0.0494	2.1759	0.6851	2.7854	0.7358	3.5656	0.7810
Jiangxi	0.0607	0.0245	0.0535	1.3906	0.5817	1.8169	0.6450	2.3740	0.7036
Shandong	0.0449	0.0233	0.0406	1.5600	0.6094	1.9110	0.6565	2.3411	0.7007
Henan	0.0701	0.0259	0.0612	1.1909	0.5436	1.6175	0.6180	2.1968	0.6872
Hubei	0.0559	0.0231	0.0494	1.6886	0.6281	2.1613	0.6837	2.7662	0.7345
Hunan	0.0565	0.0248	0.0501	1.3126	0.5676	1.6865	0.6278	2.1670	0.6842
Guangdong	0.0360	0.0199	0.0327	2.5864	0.7212	3.0465	0.7529	3.5884	0.7821
Guangxi	0.0585	0.0256	0.0519	1.1638	0.5378	1.5088	0.6014	1.9561	0.6617
Hainan	0.0385	0.0236	0.0355	1.4390	0.5900	1.7189	0.6322	2.0533	0.6725
Chongqing	0.0650	0.0221	0.0564	2.0696	0.6742	2.7441	0.7329	3.6385	0.7844
Sichuan	0.0626	0.0256	0.0552	1.2006	0.5456	1.5820	0.6127	2.0846	0.6758
Guizhou	0.0669	0.0272	0.0589	0.9498	0.4871	1.2752	0.5605	1.7122	0.6313
Yunnan	0.0607	0.0268	0.0539	0.9896	0.4974	1.2956	0.5644	1.6964	0.6291
Tibet	0.0316	0.0309	0.0314	0.4188	0.2952	0.4900	0.3289	0.5734	0.3644
Shaanxi	0.0699	0.0239	0.0607	1.5956	0.6147	2.1618	0.6837	2.9288	0.7455
Gansu	0.0573	0.0268	0.0512	0.9717	0.4928	1.2551	0.5566	1.6213	0.6185
Qinghai	0.0481	0.0247	0.0435	1.2865	0.5626	1.5987	0.6152	1.9866	0.6652
Ningxia	0.0520	0.0236	0.0463	1.5350	0.6055	1.9349	0.6593	2.4390	0.7092
Xinjiang	0.0418	0.0256	0.0386	1.0766	0.5185	1.3056	0.5663	1.5832	0.6129

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in 2030(table 5.). At the same time, there are obvious differences in growth rates among them, that is, urbanization rates are relatively higher in eastern provinces and the developed provinces, and correspondingly lower in the western regions and regions inhabited by ethnic groups.

5. Conclusions and Discussion

The implementation of the two-child policy would significantly change the trajectory of future population, and delay aging and population reduction trends into the future. Moreover, it may significantly increase the labor

Table 5. Levels of urban and rural population in different provinces after the implementation of two-child policy (million)

Provinces or Autonomous region	2020		2025		2030	
	Urban population	Rural population	Urban population	Rural population	Urban population	Rural population
Beijing	19.9888	2.7584	21.1370	2.6046	22.2602	2.4494
Tianjin	13.6168	2.2730	14.3832	1.9405	15.0966	1.6462
Hebei	45.1511	34.8252	51.5739	31.3311	57.9824	27.7437
Shanxi	23.7673	15.3947	26.9556	13.7987	30.1103	12.1815
Inner Mongolia	17.8056	9.0415	19.9611	7.9428	22.0497	6.8754
Liaoning	32.8984	13.0416	35.6407	11.8127	38.2979	10.6127
Jilin	16.4280	12.5387	17.4761	12.5079	18.5288	12.4354
Heilongjiang	24.7432	15.6796	26.5951	15.0849	28.4467	14.4424
Shanghai	23.2290	2.5779	24.1217	2.5787	24.9948	2.5739
Jiangsu	61.3700	23.1030	68.1768	19.1936	74.4722	15.6792
Zhejiang	41.4999	17.9493	45.6540	16.3726	49.7345	14.7889
Anhui	37.9063	28.1407	43.8912	24.7105	49.8028	21.2636
Fujian	28.4471	13.0740	31.9604	11.4743	35.3630	9.9177
Jiangxi	28.6748	20.6207	33.1457	18.2426	37.5761	15.8280
Shandong	64.6265	41.4283	71.9394	37.6441	79.1586	33.8120
Henan	55.5061	46.6067	65.3087	40.3769	74.9800	34.1320
Hubei	39.1637	23.1927	44.1097	20.4093	48.9112	17.6819
Hunan	41.2690	31.4411	47.1861	27.9785	53.0406	24.4770
Guangdong	83.5886	32.3191	92.8935	30.4922	102.1888	28.4773
Guangxi	27.7937	23.8829	32.2558	21.3787	36.7388	18.7815
Hainan	5.8075	4.0357	6.5003	3.7816	7.1995	3.5064
Chongqing	21.3841	10.3325	23.9001	8.7096	26.2490	7.2143
Sichuan	47.1643	39.2852	54.6166	34.5244	61.9801	29.7330
Guizhou	18.3631	19.3335	21.8755	17.1541	25.4411	14.8590
Yunnan	25.3446	25.6117	29.8765	23.0592	34.4966	20.3355
Tibet	0.9996	2.3870	1.1738	2.3953	1.3708	2.3906
Shaanxi	24.7766	15.5276	28.6753	13.2646	32.4392	11.0759
Gansu	13.7989	14.2012	16.2363	12.9359	18.7412	11.5594
Qinghai	3.5968	2.7958	4.1170	2.5753	4.6421	2.3367
Ningxia	4.4010	2.8671	5.0289	2.5990	5.6578	2.3197
Xinjiang	12.7578	11.8497	14.7522	11.2993	16.9035	10.6767

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force supply in contrast with the declining trend in labor force of the one-child policy. In general, the regional spatial pattern of China's population densities is relatively stable. China's population policy changes will lead to increased population spatial differentiation; the provinces in the southeastern region would gather more people in the future. It would also affect the population pattern on both sides of the Hu Huanyong line which the population density of southeast will increasing, and not changing significantly on the northwest side.

By calculating we find that urbanization rates in every China province are rising in 2020, 2025 and 2030, especially in Beijing, Tianjin and Shanghai. There are obvious differences in urbanization and growth rates among these provinces. Eastern provinces and the developed provinces show higher urbanization rates relatively, in contrast the western regions and regions inhabited by ethnic groups has lower rates correspondingly.

To respond to the challenges and leverage the opportunities presented by continuing urbanization, Governments should make forward-looking policies that prepare for a growing number of urban dwellers with an eye towards sustainability (United Nations, 2014) [30]. In the context of new urbanization policy and the two-child policy, we should consider the dual challenges of speed and quality of urbanization. With rapid population increase, urbanization quality should be given more attention to meet the demands of basic public education and health services. On the supply side of public services, there should be a modest increase in the provision of hospitals, schools, the construction of more physical fitness facilities and public space. The demand of population growth for land and spatial layout should be taken fully into account in the process of urban planning. Rapid increase of urban population increases demand on China's urban construction land. Limited urban land is a rigid constraint, which needs rational planning and optimizable land use.

The effect of the two-child policy implementation does not seem to be significant at present. What tells us is that we should implement the new urbanization development path into practice and change the traditional concept of development in the past rather than blindly develop large cities. The faster the development of small and medium-sized cities, the less the pressure on the lives of young people, so that they can enjoy life earlier, not just survival to buy houses that can barely afford it in large cities and megacity. The pressure of life in megacities limits their willingness to have second children. .. Based on this, China's economy will develop benignly and the problem of aging will be controlled in a certain degree.

Annotation

① The meaning of "hu's Line": The Hu Huanyong Line was put up with by Chinsese geographer Hu Huanyong in 1935, and it is a population density boundary from Aihui to Tengchong, in the southeast of this boundary there are 36% of the whole land and 94% of the whole population, which has not changed in the past 82 years and had a deep influence on the Chinese population distribution research at home and abroad.

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