

AG2412: Geovisualization
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The Population Affected By One-Child Policy in China Mainland

Introduction

The one-child policy, which is also named as family planning, is the one-child limitation in the population control policy of the People's Republic of China (PRC). The policy is enforced at the provincial level through fines that are imposed based on the income of the family and other factors. This policy was introduced in 1978, after over 30 years, it still remains a basic state policy for China Mainland. During the period, the policy had a great impact on the population. In this project, our aim is to find out the positive effects as well as the negative effects on the population. By comparing the birth rate in 1990 and 2000, we can find out whether the policy is efficient to control population. On the contrary, by looking into the sex ratio and the percentage of people over 65 years old, we can know if there would be some problems such as the gender imbalance or aging problems.

Methodology

All the population data we used were collected by the statistical bureau of China, which were recorded in the official statistical yearbook of China. The census of population is taken every ten years in China Mainland, there was a population census in 1990 and 2010 separately so the data of the 2 years are more accurate. There is a point to mention that Chongqing Municipality used to be part of Sichuan province and was independent as a municipality in the year 1997. So the data of Chongqing before 1997 was regarded as the same as Sichuan province. The yearbooks of the two years are all available on the Internet as PDF file.

A base shapefile of China was used in all the maps and was obtained from the Internet. Because the one-child policy is just carried out on China Mainland, so we didn't consider about Hong Kong, Macau and Taiwan province.
As for the coordinate system, the original map didn't use any coordinate, so China Geodetic Coordinate System 2000, which is the newest national geodetic reference system, was projected to the shapefile. This gives China Mainland a better and advanced look.

All the five maps we created use choropleth colors as the background, with indicates the population density of China Mainland. Natural break classification was used because the values of population density are not continuous, and some values are really distinct from the others, Shanghai, for example. In order to well present the distribution of the population density, it will be better to minimize the variance for all the classes to make the map more accurate. Although the variances among the classes can be very large, it is not what the project really cares.

The first map showing about the population is a cartogram with the color ramp. This kind of map distorts the boundary of the map according to the population, and it's normalized by areas. The larger the population is, the fatter the area seems to be. It's really useful to show the obviously unbalanced characteristic in regional population distribution of China. From the cartogram, map viewers can obtain a strong visual impact as well as the deep impression towards the imbalance.

The second and the third map are bar chart maps demonstrating the variation of birthrate and aging population in recent 20 years. This kind of maps shows the difference of the value directly and clearly, from which we can easily see the comparison of the two rates. It's also useful to show the non-normalized

data. Different colors were applied to each year, for the new-born rate, green color which represents new and the vigor of youth was used. On the contrary, gray and black colors were used to describe the serious aging problems.

The fourth map and the fifth map focus on the gender imbalance. At first we applied pie chart to display the percentage between men and women because it's clear to see the different proportion. However, due to the large population base, 1% difference will make a great quantitative difference, which is hard to discover in the pie chart. As a result, a quantities map with proportional symbols was applied to present the percentage of male bachelors among all the males in a certain area (here the difference of the male and female was regarded as the number of single man). It will help to illustrate the serious of the situation. A new cartographic symbol is designed here to make the map more readable and that can also be interesting.

Results

The five maps that were created and used in the project are displayed below as Figures 1-5.

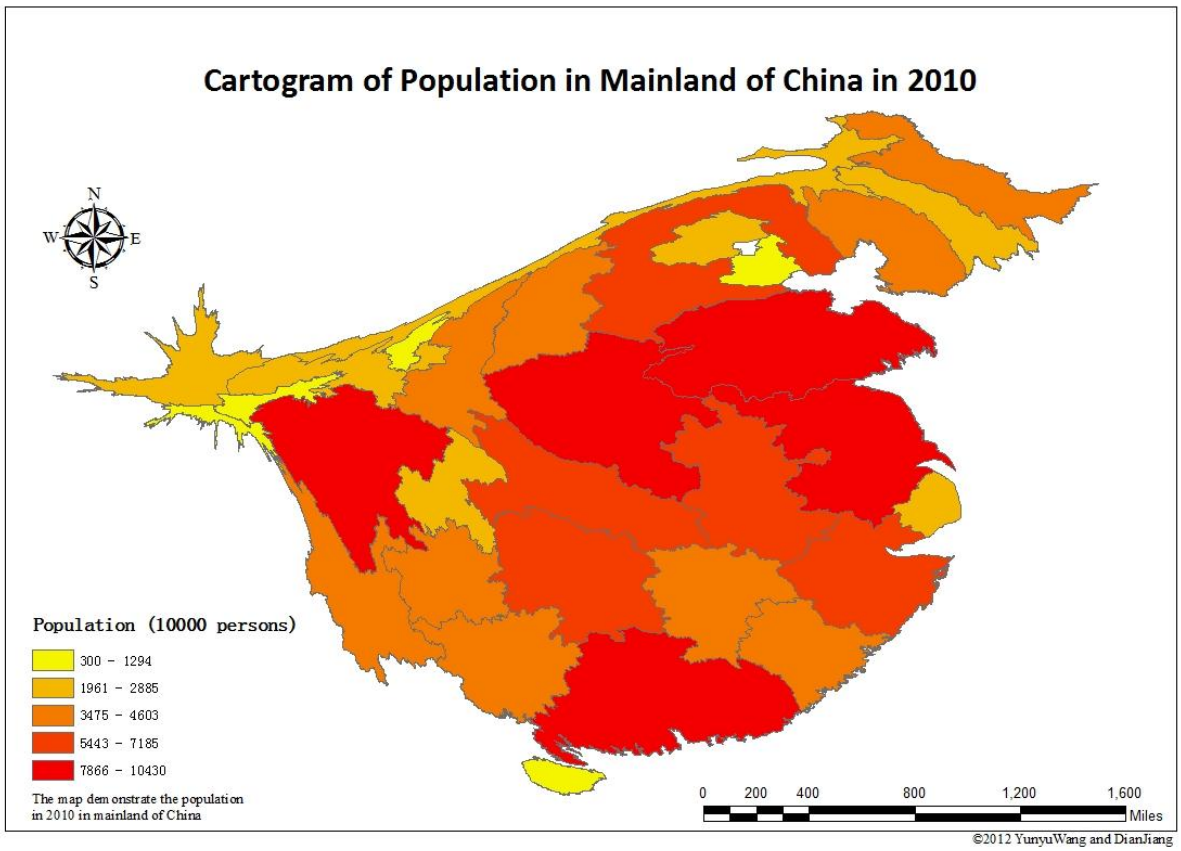

Figure 1: Cartogram of China population

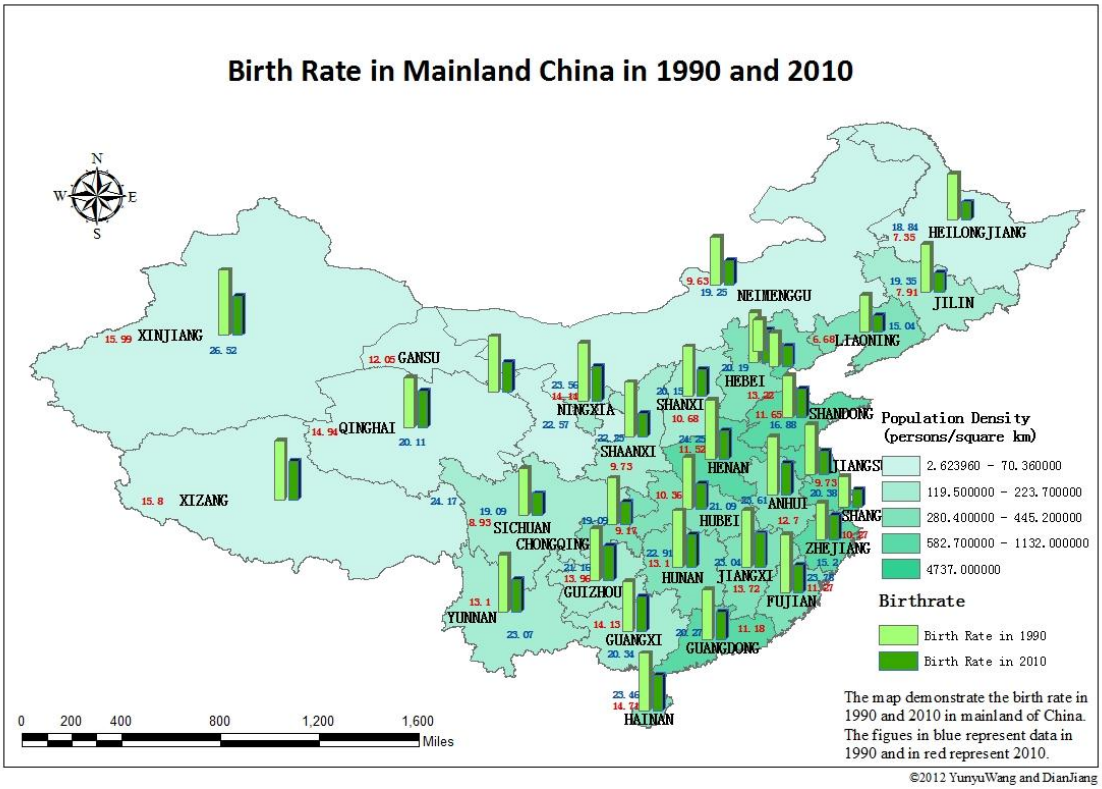

Figure 2: Birth Rate in Mainland China in 1990 and 2010

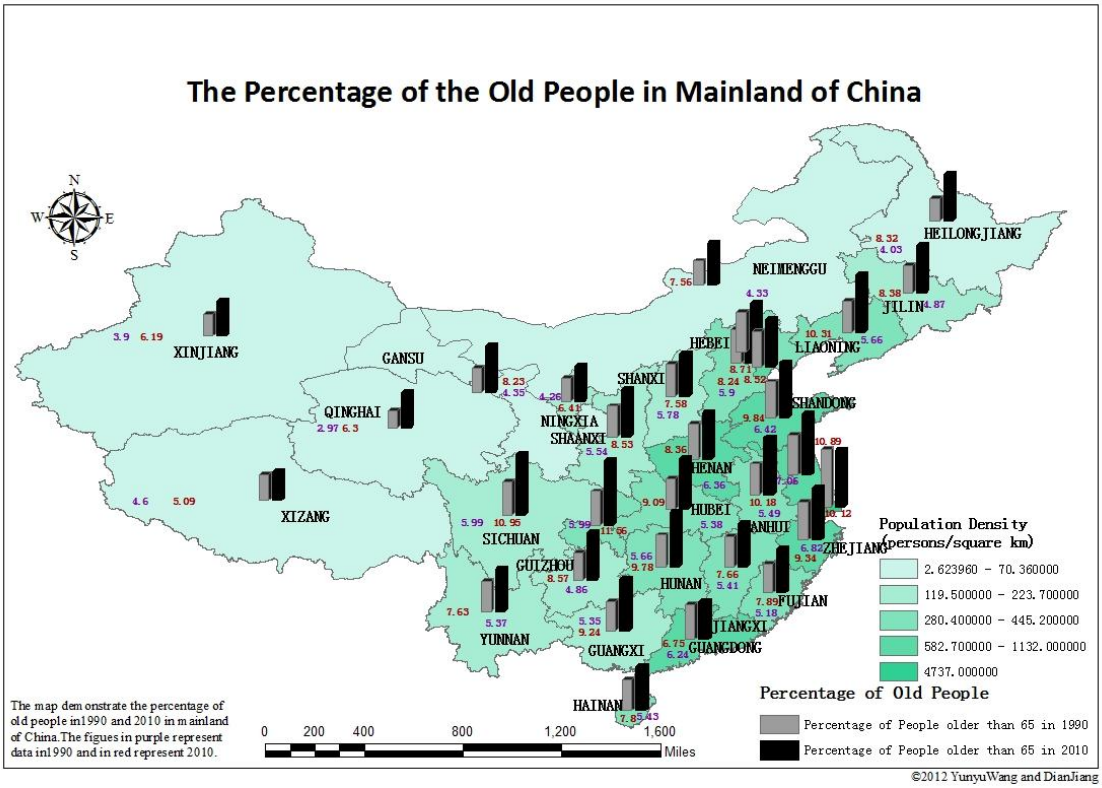

Figure 3: Percentage of old people of China Mainland in 1990 and 2010

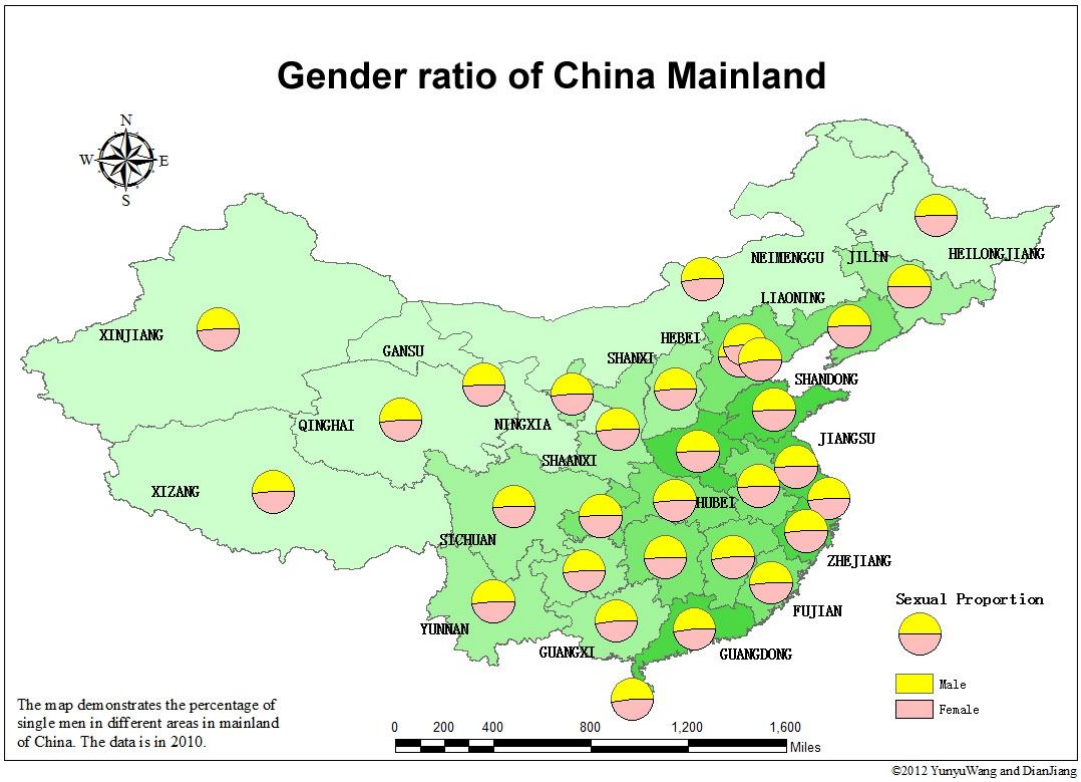

Figure 4: Gender ratio of Mainland of China

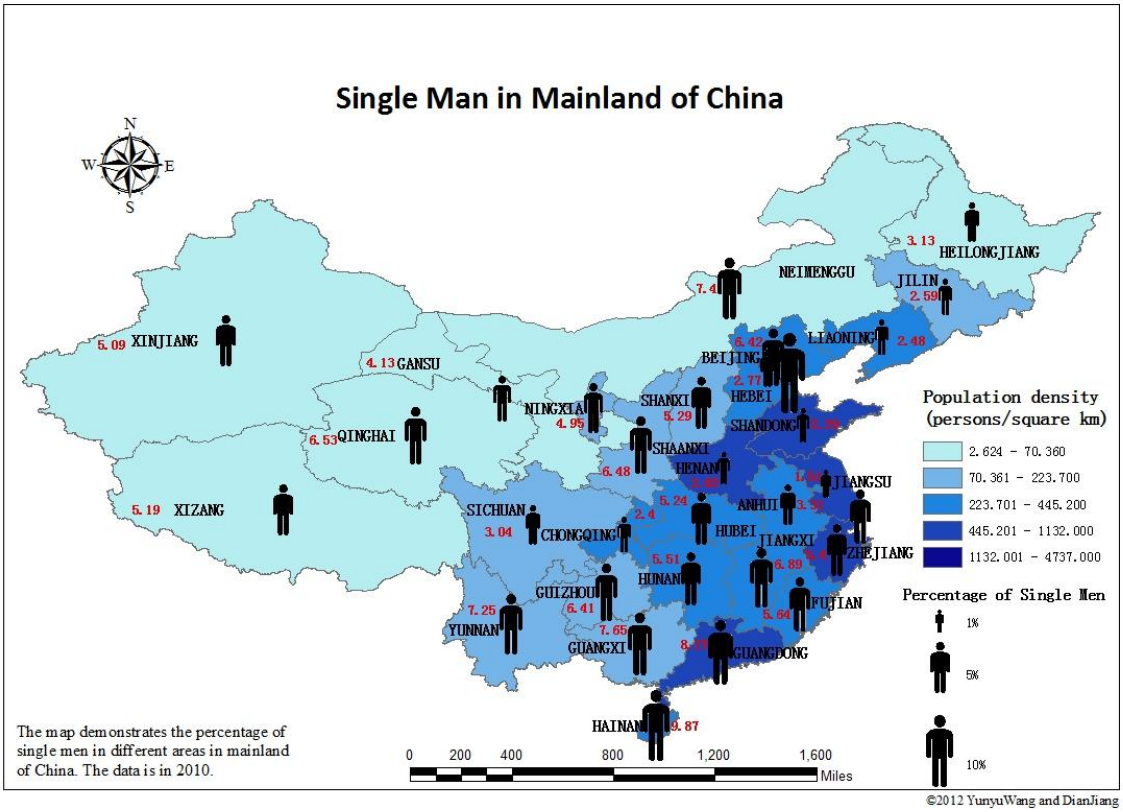

Figure 5: Single man percentage in China Mainland

Analysis and discussion

Figure 1 displays the basic population in China Mainland, from which we can see the special distribution of population. There is a large scale of distortion because of its uneven distribution. The population density varies from the west to the east as well as south to the north due to the complex natural and economic conditions. Most of the populations gather in the Yangtze delta and the Pearl River Delta where the economy is highly-developed. In contrast, because of the rugged environment, isolated geographical location and lack of development, the western regions are sparsely populated. Most of the populations in these regions are ethnic minorities, which are subjected to different laws and are usually allowed to have two children in urban areas, and three or four in rural areas. However, younger people still choose to move to coastal area to seize the opportunity of development or make a living in big cities. Therefore, the population distribution remains the same during the years.

An apparent effect of the policy is shown in **Figure 2**. The figure shows the birth rate of 1990 and 2010. Clearly, the birth rate is drastically decreasing during the 20 years. All the provinces have the decline rate around 10%. As a result, the policy has a distinct effect on reducing birthrate in most area of China, especially in the highly-developed area. But the decrease rate varies from different areas; this is because residents in some rural areas such as Anhui, Ningxia province still hold the view that more children can provide more labor force so they pay the fine to have more children. Also, as it's mentioned above, ethnic minorities in Xinjiang, Xizang, Qinghai can have more than one child.

Although the population has been effectively controlled, there are still some negative effects caused by the policy such as aging problems and gender imbalance.

Figure 3 demonstrates the percentage of people over 65 years old in year 1990 and 2010. There is a distinct increase of the numbers of old people. China has become an aging society, which brings lots of problems such as the lack of labor force and greater pressure on younger people. In some areas such as Sichuan, Chongqing and Liaoning the percentage is over 10%, which would cause serious problem on the greater pension pressure, increasing medical expenses, and the heavy burden of nursing care. What's worse, the single-child generation are now facing the serious problems that a couple should support their child as well as four or even eight old people in a family.
Surprisingly, the western part, which is not so influenced by the policy, still have the tendency to aging problems, that's because younger people choose to go to eastern part to make a living, leaving the older people at home. As a result, the increase of percentage in some areas such as Shanxi and Guangdong province isn't obvious and even remains almost the same at the low level because the two provinces are highly industrialized society which needs lots of labor force.

Figure 4 and **Figure 5** present the gender imbalance Mainland of China, which is also a negative effect caused by the policy. In the traditional Chinese point of view, males are better than females, so when being put in the situation where just one child is allowed, families have more tendencies towards boys. As a result, it's illegal to preview the gender of infants in China. But there are still many ways to know the gender of the baby and sometimes abortion might be done to female infants.
During a long period effect, the imbalance has gradually emerged. This tendency can be seen obviously on Figure 5: all the areas have more males than females. Different from the population density map, this map is not constrained by the environment and economic, even in north and west of China. The distribution of the percentage is not like that in Figure 1, apart from east area around Yellow Sea, nearly all the areas have covered by the value larger than 5%. It's because rural areas are influenced more by the traditional view of preferring sons to daughters while younger males also tend to go to big cities to make a living.

And we can see that such places like Tianjin and Hainan have a very high value in percentage of single man as there will be a male cannot find wife in every 10 males.

Nowadays the some governments have realized the serious problems caused by the policy therefore have eased the restrictions. In March 2011, the Chinese government reviewed the policy and expressed considerations to allow for couples to have a second child (MarketWatch 2011). After Henan loosened the requirement, the majority of provinces and cities now permit two parents who were only children themselves to have two children. However, even the policy will change into two-child policy, the problem will still last for a long time and remain a big challenge to China.

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