Computational Model for One-Child Death Families in China

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Abstract: - One-Child Death Families make the greatest sacrifices for China's Family Plan. Now there is support system for One-Child Death families, But the support level and coverage of this system is not enough. Computational Model is used to calculate the number of One-Child families, hazard of death, the number of death and the number of their parents whose age are more than 49, and analyze the support level of One-Child Death families in urban and rural areas, and provide theoretical and data support for the improvement of this system. The results show that, One-Child families in rural areas is less than urban areas, but hazard of death is higher in any age, so One-Child death families in rural areas is more than urban areas. The suggestion is: central government should improve social security level, and the level in urban and rural areas should be equal. Local government can provide more social support on the base of the central government support system.

Key-Words: - OCDF Model; Family Planning; Social Security

1 Introduction

Although China stopped its One-Child Policy from Jan. 1, 2016, the policy has result in huge number of One-Child Death Families (OCDF). In the past decades, there are numerous studies investigating the impacts of One-Child policy on fertility level, sex ratio, family structure, family relationships, family lifestyle, and population aging [1-5]. However, the risk of one-child families losing their only child has not received enough attention [6-8].

Children are the main source of elderly support for majority of Chinese parents, especially in the rural areas. Under current social welfare systems, the elderly of no child only receives about RMB 17035 (US$ 280) per month for rural families and 340 RMB (US$ 57) per month for urban families as allowance from the government. Losing their only child, the parents of many of the more than 150 million one-child families[9] would basically lose all hopes in life. The Chinese single-child parents have made the greatest sacrifices under the one-child policy. When the generation of single-child families increasingly reaches retirement age, the needs of social assistance for the families losing only child have become a major concern for Chinese society[10].

The prevalence of families losing only child can vary considerably across regions in China, because of the large variations in socioeconomic, demographic and institutional circumstances. For instance, there have been differentiated population policies between rural and urban areas from the commencement of family planning program.

In order to provide necessary social assistance to the elderly of OCDF, it is important to estimate the total number of OCDFs over time, accounting for the above-mentioned impacts of differentiated population policies, fertility, mortality and other socioeconomic and cultural factors. However, such studies do not exist, as far as we are aware. Our paper aims to meet this gap.

This research is mainly designed to answer four basic questions: (1) What is the current and future numbers of one-child families in China? (2) How many families have lost and may lose their only child? (2) What is the proper social assistance level for these families? and (4) How will the number of OCDFs change because of the recent adjustment to the one-child policy?

2 Methodology

To assess the number of only-child families, we calculate the probability of women having only child which is determined by the function of fertility rate and interval of childbearing.

Suppose the cohort of women N_1 having one child, when the child aged 1, 2, 3······, the women

numbered $n_2(1)$, $n_2(2)$, $n_2(3)$ $\cdots\cdots$ have the second child. The total number of women having the second child is N_2. The total number of women having only child is $N_1 - N_2$.

So when the first child aged k, the ratio of women having only child is:

$$P_1(k) = \frac{N_1 - N_2}{N_1 - \sum_{i=0}^{k-1} n_2(i)} \qquad (1)$$

The equation (1) can be written as (2):

$$P_1(k) = \frac{1 - \dfrac{N_2}{N_1}}{1 - \dfrac{N_2}{N_1} \sum_{i=0}^{k-1} \dfrac{n_2(i)}{N_2}} \qquad (2)$$

Suppose

$$r = \frac{N_2}{N_1} = \frac{TPPR_2}{TPPR_1} \qquad (3)$$

$TPPR_1$ is total progressive fertility rate of giving birth to the first child of female queue; $TPPR_2$ is total progressive fertility rate of giving birth to the second child of female queue; r is Ratio of the female who have second child to the female queue who have one child.

$$q_2(t) = \frac{1}{N_2} \cdot \frac{dN_2}{dt} \qquad (4)$$

$q_2(t)$ is interval from first child to second child; N_2 is the expectancy number of having the second child. Then equation (2) can be written as (5):

$$P_1(k) = \frac{1 - r}{1 - r \sum_{i=0}^{k-1} q_2(i)} \qquad (5)$$

The probability of women having only child can be represented as the integral equation below:

$$P_{1o}(T) = \frac{1 - r}{1 - r \cdot \int_0^T q_2(t)\,dt} \qquad (6)$$

$$\int_0^\infty q_2(t)\,dt = 1 \qquad (7)$$

where $P_{1o}(T)$ is probability of woman have only child during period T after giving birth to the first child.

As the gender of first child plays an important role in determining the possibility of having a second child, we have the equation as below:

$$\begin{cases} P_{1mo}(T) = \dfrac{1 - r_{10}}{1 - r_{10} \cdot \int_0^T q_{10}(t)\,dt} \\[4mm] P_{1fo}(T) = \dfrac{1 - r_{01}}{1 - r_{01} \cdot \int_0^T q_{01}(t)\,dt} \end{cases} \qquad (8)$$

Where $P_{1mo}(T)$ is probability to have only child during period T after giving the first birth to a boy; $P_{1fo}(T)$ is probability to have only child during period T after giving the first birth to a girl. Total progressive rate of giving birth to the first child of one female queue; r_{10} is the ratio of the female who have second child to the female queue who have a boy; r_{01} r_{10} is the ratio of the female who have second child to the female queue who have a girl.

3 Results

While one-child families in rural areas are less prevalent than in urban areas, the mortality risk of rural population is higher than urban population across all age groups and for both male and female (Fig. 1 and Fig. 2)..

We pay particular attention to the one-child families, the mortality risk and number of deaths the children of the mothers aged above 49 who pass the age of childbearing. We then analyze the current and needed support social assistance levels for the OCDFs in urban and rural areas, and provide references to improve the current support system.
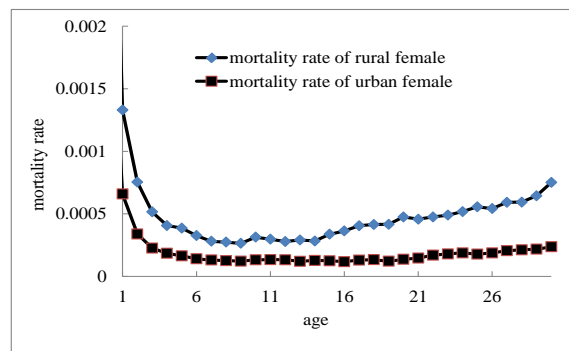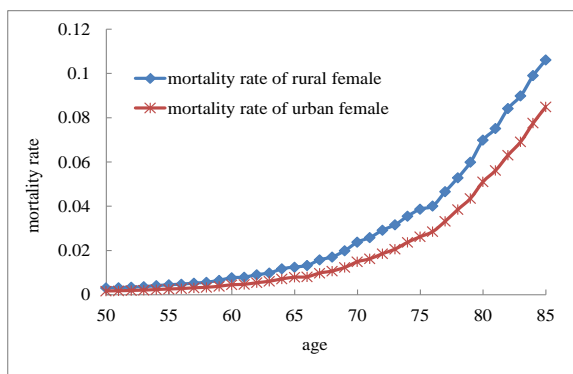

Fig.1 Mortality rate of young female

Fig.2 Mortality rate of old female

The result shows that up to 2010 , there are 79.49 million one-child families in rural areas and 99.27 million one-child families in urban areas (Fig. 3). Among the total one-child families, 2.41 million families have experienced deaths of their only child, 1.59 million in the rural and 0.83 million in the urban areas. The number of parents who lost their only child and the wives aged more than 49 is 553 thousand in rural areas, and 268 thousand in urban areas. The figure is projected to continuously increase in the next two decades.

The current monthly allowance to the OCDFs as social assistance provided by government to the OCDFs is 170 yuan for the rural families and 340 yuan for the urban families. This is not reasonable. Rural families contributed the same as urban families for population control in China. Many other welfare policies have been made with less support for rural families because of different living cost in rural and urban areas.
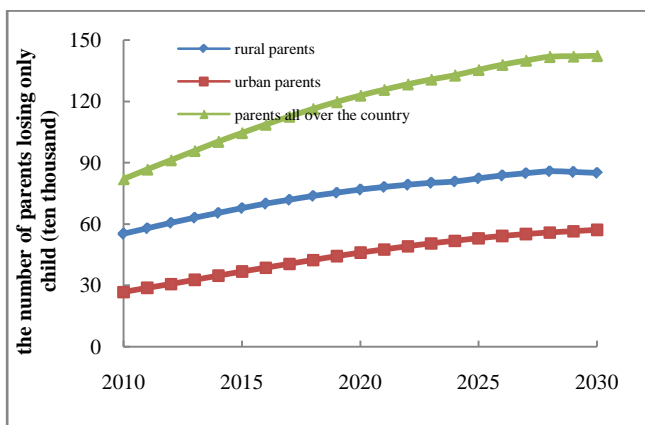

Fig.3 The number of parents aged at 49 and over who lose their only child from 2010 to 2030

We suggest that the social assistance level should be the same for rural and urban families. The social assistance from the central government should increase 500 yuan for parents aged 49-59, and 800 yuan for parents aged above 60. Local government can also provide more support according to the central government's policy. Based on our estimated number of OCDFs over time, the amount of funding demand will be 5.11 billion in 2010, and 13.47 billion by 2030(Fig.4). We will estimate the changes in the number of OCDFs and their implications for improving the social welfare system based on the possible impacts of adjusting family planning policy on fertility and mortality, accounting for the propensy of couples who are eligible to give a second birth actually take the chance, the prevalence of fecundity by age of the wives, and the potentially changing gender preferences of the couples for those second births.
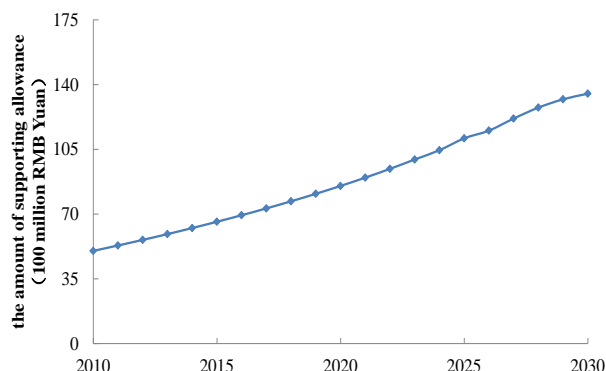

Fig.4 Fiscal expenditure given to the parents aged at 49 and over who lose their only child

4 Conclusion

Our study reveals that although the numbers of only-child families in rural areas are smaller than in urban areas, the risk of death in rural areas is higher than in urban areas among groups of XXXX. As a result, , there are more OCDFs in rural areas. The study suggests that Chinese central government should increase the level of social assistance to the OCDFs and an improved the social welfare system is especially needed for the rural area which is currently much less complete than in the urban areas.

(1) Up to 2010, there are 79.49 million one-child families in rural areas and 99.27 million one-child families in urban areas. A total 2.41 families nationwide have experienced deaths of their only child, with 1.59 million in the rural and 0.83 million in the urban areas.

(2) The number of parents who lost their only child is 553 thousand in rural areas, and 268 thousand in urban areas.

(3)The social assistance level should be improved to be 500 yuan for parents aged 49-59,

and 800 yuan for parents aged more than 60. Given the increasing number of OCDFs over time, the amount of funding needed will be 5.11 billion in 2010, and 13.47 billion by 2030.

(4)While the newly implemented adjustment to the one-child policy may potentially drive down the number of OCDFs, large variations may exist due to the changing desired family sizes, gender preferences and other socioeconomic and demographic conditions.

Now all couples in China will in future be allowed to have two children, not one, the Communist Party announced on 29 October, 2015. The ending of the one-child rule was not unexpected, experts say. Low fertility rates in countries such as Japan and Germany are leading to an ageing population, raising concerns over the mounting costs of social welfare and health systems. China's decision seems to have been prompted by similar worries.

But it will hardly have a major long-term effect on population growth in modern China, where many women are now more concerned about jobs and careers than is reconcilable with having a large family. There are just too many constraints in terms of housing and education for most Chinese couples to have two children. So in a long time, OCDFs will keep increasing, and then decline gradually. Until 2040-2050, the parents who are influenced by One-Child Policy will quit from the cohort, and the social support can be stopped.

5 Acknowledge

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