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How does Education Affect Women's Fertility Desire of Childbearing Age

-- Analysis based on CGSS2017 Data

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Abstract: Based on the data of CGSS (Chinese General Social Survey) in 2017, this paper conducts an exploratory study on the relationship between fertility desire and education among women of childbearing age. The results show that: First, the fertility desire of women in eastern part of China is significantly lower than that in central and west; Secondly, the longer a woman's years of education, the lower her desire to have children; Finally, the impact of education difference on non-eastern women is more significant. The influence of economic and educational development on fertility desire is consistent, which reveals that the aging phenomenon is accompanied with the social development process, so we need to analyze it from an objective perspective.

Keywords: Education; Fertility Desire; Aging.

1. Introduction

Population aging is a topic that has attracted much attention in recent years, and the continuous decline of fertility rate has become a common issue in most developed countries and regions. Since the reform and opening up, economic level in China has continued to develop, at the same time, the trend of population aging has gradually accelerated. According to the results of the 2021 population census, the population aged 60 and above is 264.02 million, accounting for 18.70%, of which 19.064 million are aged 65 and above, accounting for 13.50%. Compared with 2010, the proportion of people aged 60 and above has increased by 5.44 percent.

The quantity and quality of the population are important factors affecting sustainable social and economic development. Faced with the crisis of population resources, China's family planning policy has undergone three major adjustments in recent years: following the implementation of the "selective two-child policy" in 2013, the "universal two-child policy" was introduced in 2015.On May 31, 2021, the Political Bureau of the CPC Central Committee held a meeting and carry out the policy that a couple can have three children in order to further optimize the fertility situation, announced the comprehensive opening of "three-child policy" .

However, since the implementation of the "two-child policy", the phenomenon of fertility accumulation has not arrived as scheduled, and the second child birth rate in urban area is still lower than that in rural area. In other words, the fertility rate has not increased significantly, and the fertility desire has not been fundamentally improved, which requires us to think deeply about the constraints of fertility desire.

With the development of society and the emancipation of thought, the education year of Chinese women increased significantly, and "educated women" have emerged in large groups, playing a mainstay role in all walks of life. Therefore, some studies have pointed out that is there any connection between lower fertility rate and intellectual women. Based on the above logic, this paper selects the data of Chinese General Social Survey (CGSS) in 2017 to systematically investigate the relationship between the years of schooling and fertility desire of Chinese women of childbearing age.

2. Literature Review and Research Hypothesis

The relationship between education and fertility has always been the focus of scholars in the West. Based on the perspective of "income-cost" research, Becker pointed out that education can improve the quality of workers, thus increasing people's income, and relax the budget constraint of families to invest in children. If children are regarded as normal commodities, families with higher income will have higher fertility willingness.[1] This view of Becker connects the relationship between education, economy and fertility, and clarifies the view that educational background can affect income, which in turn can affect fertility. Domestic scholars Liang Hong and Song Jian are highly consistent with this view. They point out that a woman's personal economic level is related to her right to speak in family, and the family's economic basis determines whether a family can afford the cost of child-rearing.[2] With higher family income, women of childbearing age are more willing to have a second child.[3]

On this basis, on this basis, the first hypothesis can be proposed:

H1: The fertility intention of women of childbearing age in the eastern region is lower than that in other regions. The educational resources in the eastern part of China are more complete, and the economy is also more developed. Therefore, women of childbearing age in the eastern region will have more opportunities for education and development, and gain more economic capital, which shows that the fertility willingness of women in the eastern region is lower than that in other regions.

Domestic scholar Liu Zhangsheng saw the influence of culture on the basis of education. They pointed out that education would influence women's willingness to have a second child through the "cultural-cognitive" function, and through the channels of "changes in marriage and

childbearing concepts", "social cognitive bias" and "traditional cultural separation", resulting in the reduction of fertility rate.[4]The research of Wang Ying also shows that the education level of women of childbearing age has a inhibitory effect on the willingness to have a second child, that is, educational resources have an impact on the cognition of women in childbearing age through cultural export.[5]

Therefore, the second hypothesis can be proposed:

H2: The longer the years of education for women of childbearing age, the lower their fertility desire would be. Education enhances individual independence, encourages individuals to pursue different values, and causes changes in the concept of marriage and childbearing. Therefore, the longer one is educated, the lower one's willingness to have children may be.

However, in academia, there is no standard answer on the relationship between education level and fertility desire. For example, Mills (2018) believe that women with higher education have higher income level and family status, which can promote both husband and wife to share housework equally, and therefore have stronger fertility desire.[6] Zhang Wanyi also pointed out that with the improvement of education level and income level, people's fertility desire did not change linearly, but showed an inverted "U-shaped" relationship.[7]

According to the existing research results, the relationship between fertility desire and education of women is controversial, and the difference of samples and methods will cause the difference of results. Therefore, on the basis of the existing studies, this paper uses the relevant data of CGSS2017 to carry out exploratory research, trying to explain the influence of education on fertility desire and its mutual relationship.

3. Research Design

3.1. Data

The data of 2017 Chinese General Social Survey (CGSS) is used in this study. Chinese General Social Survey (CGSS) is the first nationwide, comprehensive and continuous large-scale social survey project in China. This database uses the method of multi-stage random sampling to comprehensively collect the data of society, community, family and individual at multiple levels, which has important scientific and practical significance. The survey data of CGSS2017 has been released on October 1, 2020, and a total of 12,582 valid samples have been collected. According to the needs of this study, we sampled all the female samples of childbearing age between 22 and 49 years old in the valid sample, involving 28 provinces, with a total sample size of 2,441, which is widely regional and representative.

3.2. Variables

3.2.1. Dependent Variable

The focus of this study is to find the relationship between years of education and female fertility desire, so this paper takes female fertility desire as the dependent variable. CGSS designed such a question to measure fertility desire, "If there were no policy restrictions, how many children would you like to have?" On this basis, this paper divides the desire to have children into four categories: no intention to have children, intention to have 1 child, intention to have 2 children, intention to have more than or equal to 3 children, with values of 0, 1, 2 and 3 respectively.

3.2.2. Independent Variable

There are two core independent variables in this paper. One is the years of education. CGSS divides the maximum years of education into 13 options: "no education, private literacy classes, primary schools, junior high schools, vocational high schools, regular high schools, secondary schools, technical schools, junior college (adult higher education), junior college (formal higher education), undergraduate college (adult higher education), undergraduate college (formal higher education), postgraduate and above". By regrouping and assigning values, 0 is assigned to those who have not received any education, 2 to private literacy classes, 6 to primary schools, 9 to junior high schools, 12 to vocational high schools, regular high schools, technical secondary schools and technical schools, and 15 to adult higher education, formal higher education, junior college and undergraduate. Graduate students are assigned a value of 19.

The second is the region. By regrouping and coding the interview locations, we divided them into 0 "non-eastern region" and 1 "Eastern region".

3.2.3. Control Variables

Based on previous studies, this study selected other variables that may affect fertility desire as control variables, namely, age, age square, ethnicity, marital status and urban or rural area. Age refers to the actual age of women of childbearing age, which is usually limited to 15-49 years old. Considering that the minimum age in the sample is 22 years old, the age is limited to 22-49 years old. At the same time, in order to prove the influence of age on fertility desire is not in a simple and unidirectional way, this paper introduced the age square term; For ethnic groups, the value of "Han" is 1, and the value of all other minorities is 0; The CGSS survey on marital status has eight options, including "unmarried, cohabiting, first marriage with spouse, remarriage with spouse, separation without divorce, divorce, widowed". We assign "first marriage with spouse", "remarriage with spouse" and "separation without divorce" to the married group with a value of 1, and other situations are uniformly classified as 0. For the urban and rural areas where they are located, the urban group is assigned a value of 1 and the rural group is assigned a value of 0.

3.2.4. Interactive Variables

This paper aims to explore the influence of education level on fertility desire and whether there are regional differences in its influence. On this basis, the variable "years of education" and the variable "region" are interacted in this paper, aiming to find out whether the differences in the development of eastern, central and western regions will have different impacts on individuals' educational attainment and thus create different fertility motivations. The descriptive statistics of each variable are listed in Table 1.

3.3. Research Methods

Since the dependent variable fertility desire is a classified and ordered variable, this paper selected the ordered logistic regression model (ologit model) for statistical analysis. Investigating the influence of the independent variable "years of education" on the dependent variable "fertility desire" by the occurrence probability.

Table 1. Descriptive statistics of variables

Variable			Variable interpretation	Obs	Mean	Std. Dev	Min	Max
dependent variable		fertility desire	No desire to have children: 0, Willing to have 1 child :1, Willing to have 2 children: 2; Willing to have 2 children: 2; Willing to have 3 children: 3; willing to have 3 children: 3; More than 3 children: 4	2441	1.805	675.	0	4
independent variable	control variable	Age	Age= 2021-year (a31)	2441	37.371	7.655	22	49
		age^2	Sum of the squares of the ages	2441	1455.185	563.716	484	2401
		eth	ethnic Han: 1, Minority: 0	2441	91.	286.	0	1
		marriage	Married: 1, The rest: 0	2441	757.	429.	0	1
		urban	Urban: 1, Rural 0	2441	718.	45.	0	1
	key variable	east	East: 1, Else: 0	2441	469.	499.	0	1
		school	According to the school years, the value is 0,2,6,9,12,16,19	2441	6.077	7.029	0	19

4. Research Results

4.1. Ologit Nested Regression Model

Based on the research hypothesis of this paper, Stata statistical software is used to establish a nested logistic regression model of the influence of education on fertility desire. The regression results of ologit model are shown in Table 2.

Table 2. Ordered Logistic model

	(1)	(2)	(3)
age	- 0.170 ** (0.0629)	- 0.139 * (0.0636)	- 0.125 (0.0638)
age^2	0.00241 * * (0.000835)	0.00191 * (0.000844)	0.00174 * (0.000847)
eth	0.407 * * (0.157)	0.346 * (0.157)	0.370 * (0.158)
marriage	0.653 * * * (0.127)	0.566 * * * (0.129)	0.551 * * * (0.129)
urban	0.262 * * (0.0974)	0.0292 (0.107)	0.0456 (0.108)
east		0.261 * * (0.0927)	0.367 (0.267)
school		0.0431 * * * (0.0119)	0.0202 (0.0150)
school_east			0.0523 * (0.0209)
N pseudo R2	2441 0.016	2441 0.021	2441 0.023

Standard errors in parentheses

* $p < 0.05$, **$p < 0.01$, ***$p < 0.001$

In model 1, age, age square, ethnicity, marital status and urban or rural area have significant effects on fertility desire of women. In Model 2, region and education have significant effects on fertility desire of women, but with the introduction of these two variables, the effect of urban or rural area is no longer significant. In Model 3, the influence of education and urban or rural area is interacted, aiming to explore the influence of education on fertility desire in different areas.

4.2. Result Analysis

4.2.1. The Overall Status of Fertility Desire of Women of Childbearing Age

First, model 1 is established with age, age square, ethnicity, marital status and urban or rural area as independent variables. It can be seen that marital status has a significant impact on the fertility desire of women of childbearing age. Other variables also have important effects, but there are differences in effect.

Specifically, marital status has the most significant impact on fertility desire of women, and the effect is positive. In other words, married women of childbearing age are more willing to have children than unmarried or divorced women. The data shows that the fertility desire of married women is 0.92 times higher than that of non-married women (exp0.6533-1 =0.9213, $p<0.001$).

Age also has a prominent effect on the fertility motivation of women of childbearing age. To be specific, for every unit

increase in female age, the intention to have children decreased by 0.19 times compared to the previous unit (exp0.17-1≈0.1853, $p < 0.001$). However, by treating the age with the sum of squares, we find that the influence of female age on fertility desire is not a simple linear relationship, but a marginal effect. That is to say, when women's age reaches a certain standard, their fertility will have an upward trend. It can be explained that with the growth of women's age, their fertility will decline at first, then rebound after reaching a certain level, and then steadily rise, there is a U-shaped curve relationship between women's age and fertility will. Compared with young women, middle-aged women have accumulated some capital to, thus, they have the time, energy, and financial resources to take the responsibility of childbearing. Therefore, the growth of age within a certain range will have a positive impact on fertility desire to a certain extent.

Ethnic group has a remarkable influence on the fertility desire of women. The fertility desire of ethnic minority women is 0.5 times higher than that of Han women (exp0.17-1≈0.5023, $p < 0.001$). The area of urban or rural also has a significant impact on the fertility will. The fertility desire of women of reproductive age living in rural areas is 0.3 times higher than that of women living in urban areas (exp0.262-1≈0.2995, $p < 0.001$).

4.2.2. The Region of Women and Their Fertility Desire

Model 2 introduces two key variables, region and years of education, on the basis of model 1. the data shows that the influence of age, ethnicity and marital status on women's fertility desire is still significant, while the influence of urban or rural is no longer distinct. That is to say, after introducing the role of region and years of education, the influence of urban or rural areas is no longer obvious. After controlling for other factors, the newly introduced region variable is significantly negative at the level of 5%, which indicates that there are significant regional differences in women's fertility desire, and the fertility desire of women of childbearing age in eastern part of China is significantly lower than that in other regions. Specifically, it can be explained that the fertility will of women of childbearing age living in eastern China is 0.3 times lower than that of women living in other regions (exp0.261-1≈0.2982, $p < 0.001$). This can further confirm the first hypothesis of the study, that is, H1: The fertility desire of women of childbearing age in the eastern part of China is lower than that in other regions.

Since the reform and opening up, the coastal development strategy has enabled the eastern region of China to develop rapidly, and maintain a leading position to become the core area that drives the continuous and rapid growth of the national economy. In contrast, the development effect of the central and western areas of China is relatively slow and lags behind the eastern areas to a certain extent. Due to economic development and abundant resources, the eastern region has taken a leading position in education, health care and employment. In particular, the abundant teachers and resourceful teaching supplies have made the education level in the eastern region far ahead. Therefore, under the influence of external conditions, the fertility desire of eastern women in China may be higher than that of other regions in general.

4.2.3. The Years of Education and Their Fertility Desire

In addition to region variable, Model 2 also introduces years of schooling as a key variable. After controlling for other factors, the region variable is significantly negative at the 1% level, indicating that the difference in years of education significantly affects women's fertility intention. In other words, the longer a woman's years of education is, the lower her fertility desire would be. Under the premise of controlling other variables, the increase of one unit in the years of education correspondingly reduced the female fertility desire by 4% (EXP0.0433-1 ≈0.04404, $p < 0.001$). On this basis, hypothesis 2 is verified, that is, H2: the longer the years of education for women of childbearing age, the lower their fertility desire would be.

The development of education generally improves people's education status, so that education can improve people's working ability and wage level. Especially for women, women with high level of education are more likely to accumulate capital and obtain higher economic benefit than that with less education. However, giving birth to more children means that the family needs to invest more money and time. From the perspective of benefit maximization, it is inevitable that people will reduce their fertility willingness. At the same time, the development of education has brought about the liberation of the mind, and the traditional fertility culture such as "raising children for old age" is gradually weakening. Fertility is no longer the ultimate goal of life, and women have gained more rights and opportunities to make their own choices, which will weaken women's fertility willingness to some extent.

4.2.4. The Interaction between Region and Years of Education

On the basis of model 2, we add the interaction term of region and years of education to build Model 3. The effect of the interaction term of the model can reflect the influence of education on fertility desire in different regions. According to Model 3, the main effects of variables such as age, urban or rural areas, region and years of education in the model are not significant, indicating that compared with the interaction between region and education, the effects of other variables on fertility desire are not obvious. And the significance level of the interaction term is negative, it indicates that compared with the residents in the eastern region, the influence of education on the fertility intention of women in non-eastern regions is more significant, that is, the impact of education difference on the fertility intention of non-eastern women is greater than that of eastern women.

Compared with the east, the quality of education in the central and western regions is more uneven, and the distribution of educational resources is the same. Therefore, the effect of the increasing education years on the non-eastern regions is more obvious than that in the eastern regions. In the eastern region, where education development is more balanced, the effect of increasing years of education on fertility intention is not so prominent.

5. Study Conclusion

Based on CGSS2017 survey data, this paper took years of education as the core variable, controlled variables such as age, age squared, ethnicity, marital status and urban or rural areas, and applied the ologit model for regression analysis. The following conclusions were drawn: First, the fertility desire of women in eastern part of China was significantly lower than that in central and western China; Secondly, the longer a woman's years of education is, the lower her fertility desire will be; Finally, the impact of education difference on non-eastern women is more significant.

The results of this study indicate that education level is an

important factor affecting fertility intention of women of childbearing age. Education can not only improve people's quality of life by affecting the level of employment, but also improve the quality of the population, and promote development of science and technology. However, with the improvement of education level, there will be a trend of ideological liberation of the public, which will have a certain impact on the traditional concept. The decreasing of fertility desire is one of the prominent manifestations.

As for the prominent problems of "fewer children" and "aging" at this stage, we need to treat them with a dialectical perspective. On the one hand, excessive aging will indeed cause the shortage of population resources; On the other hand, aging is an inevitable trend along with the development of social modernization. "Giving birth" is not just an isolated event, it has a lasting impact on the life course of individuals and families. Therefore, it is necessary to consider more about the women and families, pay more attention to their life, work, parenting and development, and try to reduce the worries of childbearing for them. As the CPC Central Committee pointed out in the three-child policy, it is necessary to "optimize the fertility policy and speed up the connection of supporting measures". Only by reducing the cost of childbearing and improving the guarantee of marriage, can people's concerns and fears be reversed and the long-term development of population structure be promoted.

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