

Study On the Fertility Intention of Residents in Guangxi Province Under the Three-Child Policy

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Abstract. In 2022, a series of supporting policies of "three children" were determined in the NPC and CPPCC. Based on the reality of declining birth rate in successive years, Guangxi actively responded to the call and issued relevant supporting measures for three children. However, it remains to be seen whether these measures can really stimulate people's desire to have children, given the enormous pressure to do so. Therefore, this project intends to conduct online questionnaire survey and offline field survey in urban and rural areas after the introduction of supporting measures on the change of the three-child fertility intention of the child-bearing age group in Guangxi and its influencing factors. By climbing the key words to design the questionnaire, descriptive analysis of the data is conducted. Besides, neural network and decision tree are used to analyze the influencing factors of fertility. It also gives the countermeasures and suggestions under the three-child policy in order to provide the scientific basis for the relevant departments to formulate the fertility policy.

Keywords: Fertility intention, influencing factors, neural network model, decision tree.

1. Introduction

China began to implement the family planning policy in the 1970s, which has achieved great results. But decades later, the problem of "population aging" has become a serious challenge for the country. In order to increase the birth rate, China's birth policy has been adjusted continuously, from the "two-child fertility policy for couples where either is from a single-child family" policy in 2011, to the "two-child fertility policy for couples where either the husband or the wife is from a single-child family" policy in 2013, and then to the "universal two-child" policy in 2016, hoping to stimulate the birth rate. However, since 2016, China's birth rate has been declining continuously. In addition, due to the impact of the epidemic in 2020, the birth rate of the Chinese has dropped from 13.57% in 2016 to 7.52% in 2021, which is the lowest since the innovation century. In a word, the birth rate and natural growth rate of the population have generally shown a downward trend since 2011, and the problem of low birth rate has become increasingly serious[1].

Guangxi has entered the aging stage since 1996, which is the earliest province to enter the aging stage. At the same time, the aging degree of Guangxi ranks 11th in the national ranking, which belongs to the top ranked provinces. According to the data of the seventh census, the population aged 60 or above in Guangxi has accounted for 16.69% of the total population, especially in Guilin, where it has exceeded 20%[2]. The high proportion of the elderly population means the pressure of dependency ratio is high, the pressure of elderly health service supply is increasing, and the vitality of urban economic development is relatively insufficient, which brings adverse development to the city. Since the one-child policy began to be implemented in the 1970s, the birth rate of Guangxi has been declining continuously since 1996, from 16.83% in 1996 to 14.13% in 2010. In November 2011, China issued a series of policies to promote fertility. After the policy was promulgated, the birth rate of permanent residents in Guangxi increased somewhat but remained basically unchanged. By 2019,

the birth rate of permanent residents in Guangxi was 13.31%. However, since the impact of COVID-19 in 2020, the birth rate of permanent residents in Guangxi plummeted to the lowest percent, 9.68%[3].

Therefore, this study investigates the changes and influencing factors about the fertility intention on families of child-bearing age to have more children after the introduction of supporting measures in Guangxi, so as to provide a scientific basis for relevant departments to formulate effective fertility policies and make a contribution to encourage fertility and alleviate the current situation of accelerated population aging in Guangxi.

2. Analysis of influencing factors of fertility intention based on machine learning method

2.1. Analysis on influencing factors of fertility intention based on neural network model

This paper uses SPSS software to establish a neural network model with the ratio of training set and test set as 7:3, in which 11 variables such as age, income, education level and overall understanding level are taken as input variables, and fertility intention under the three-child policy is taken as output variables. Neural network model diagram is shown as Figure3[4].

Through the analysis, it can be seen that the gain of fertility intention of 2 is relatively large, while the prediction pseudo-probability of fertility intention of 1 is relatively large. Therefore, it can be seen that people's fertility intention will decrease in the future. Proportion of increase in willingness to have children under the three-child policy is shown as Table1.

Dependent Variable: Willingness to give birth under the three-child is shown as Figure2. Willingness to give birth under the three-child policy is shown as Figure3. Neural network model variable importance plot is shown as Figure4.

Table. 1 Proportion of increase in willingness to have children under the three-child policy

The degree of willingness to have children under the three-child policy	The area below the curve
1	0. 651
2	0. 766
3	0. 587
4	0. 704

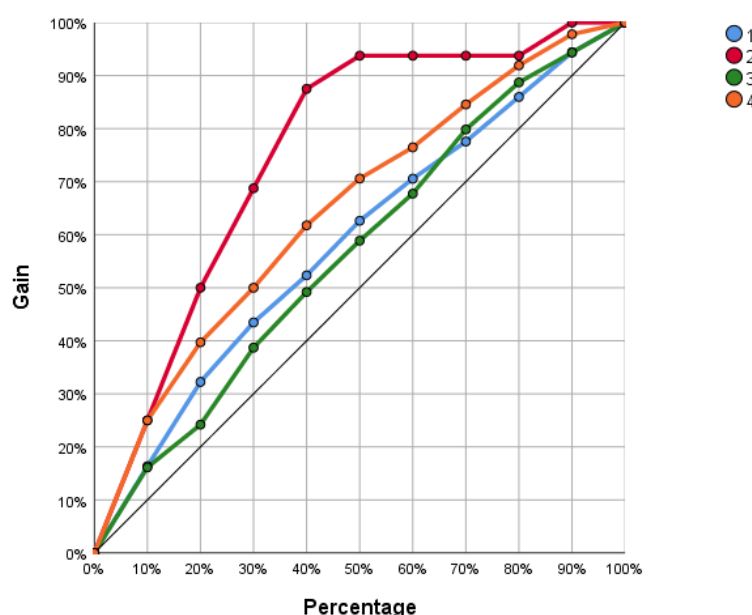


Figure. 1 Dependent Variable: Willingness to give birth under the three-child policy

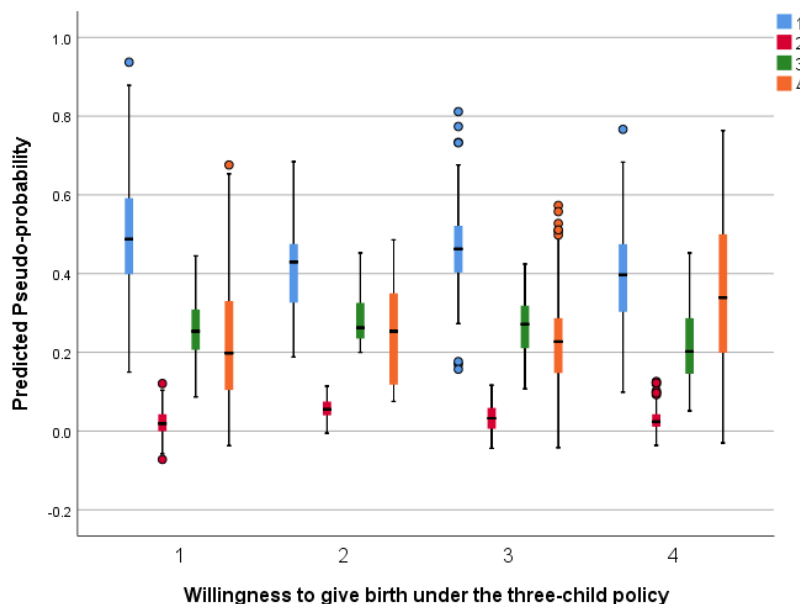


Figure. 2 Willingness to give birth under the three-child policy

According to the results of the neural network model, there are 5 neurons in the hidden layer of the model, and the accuracy and precision of the training set and the test set are relatively high, indicating that the neural network model has certain reliability and stability. As can be seen from the importance chart of variables Figure4, support for the three-child policy and overall understanding account for the largest proportion, which has the greatest impact on people's fertility intention. In addition, health conditions, the impact of women's employment and the impact of the epidemic on income are also important factors affecting people's willingness to have children.

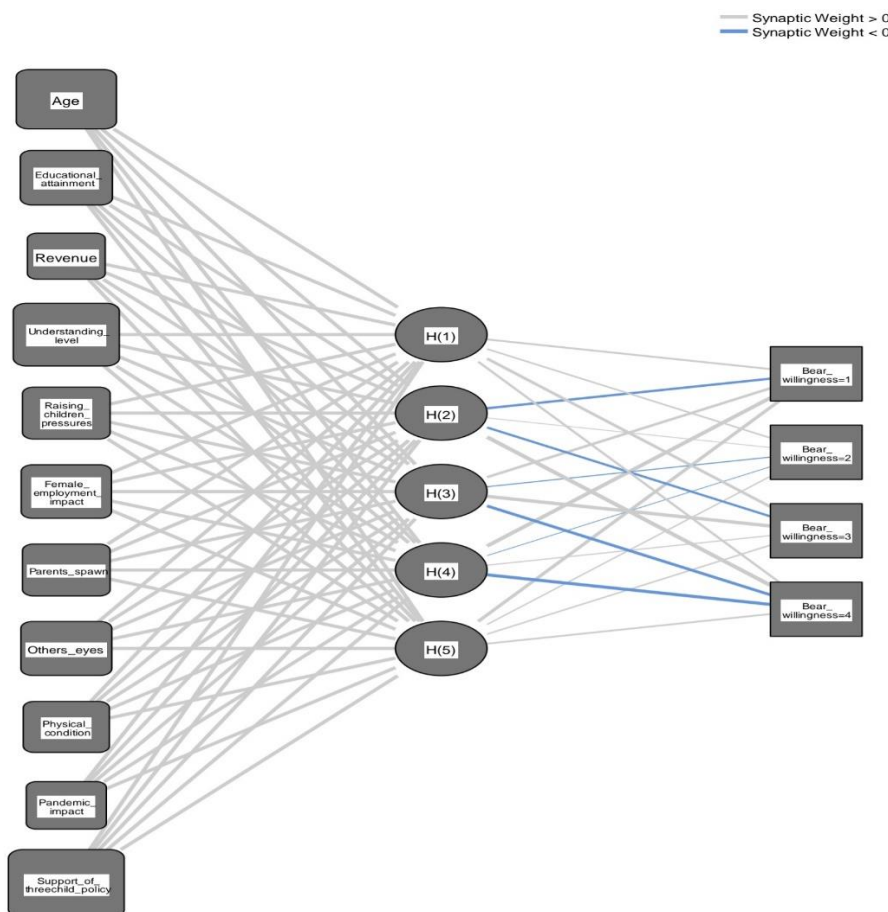


Figure. 3 Neural network model diagrams

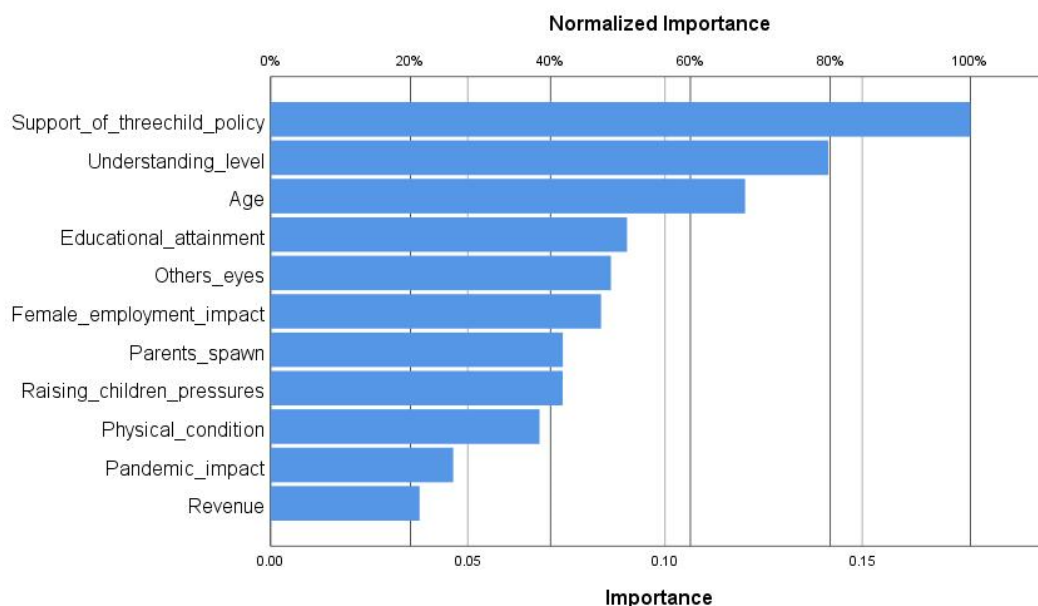


Figure. 4 Neural network model variable importance plot

2.2. Analysis on influencing factors of fertility intention based on decision tree model

In order to further explore the influencing factors of fertility intention, SPSS software is used again to establish a decision tree model with the ratio of training set and test set as 7:3, as shown in Figure 5. Factor importance plot under decision tree model is shown as Figure6.

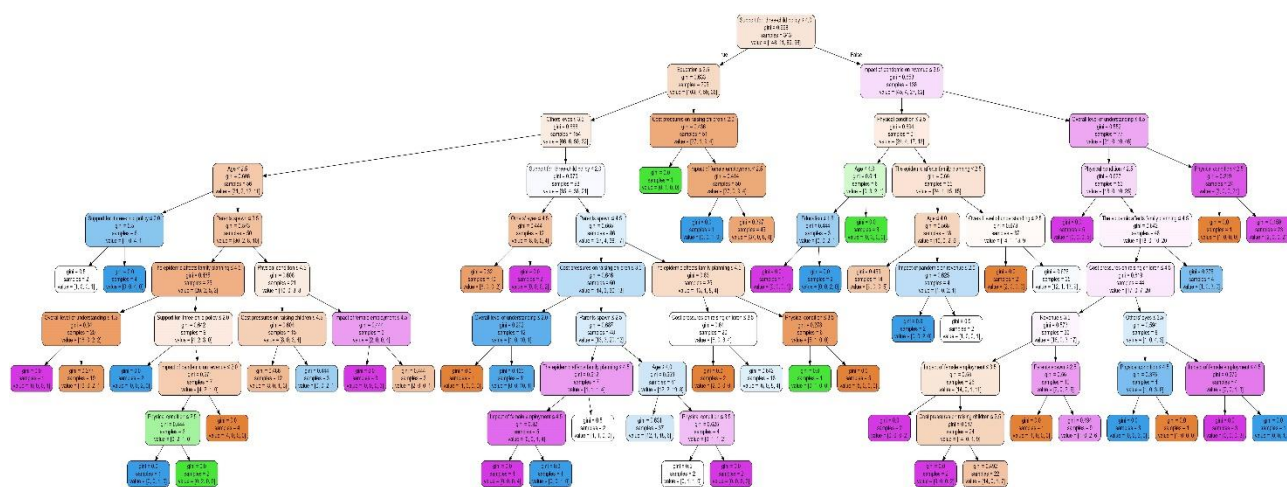


Figure. 5 Decision tree diagram

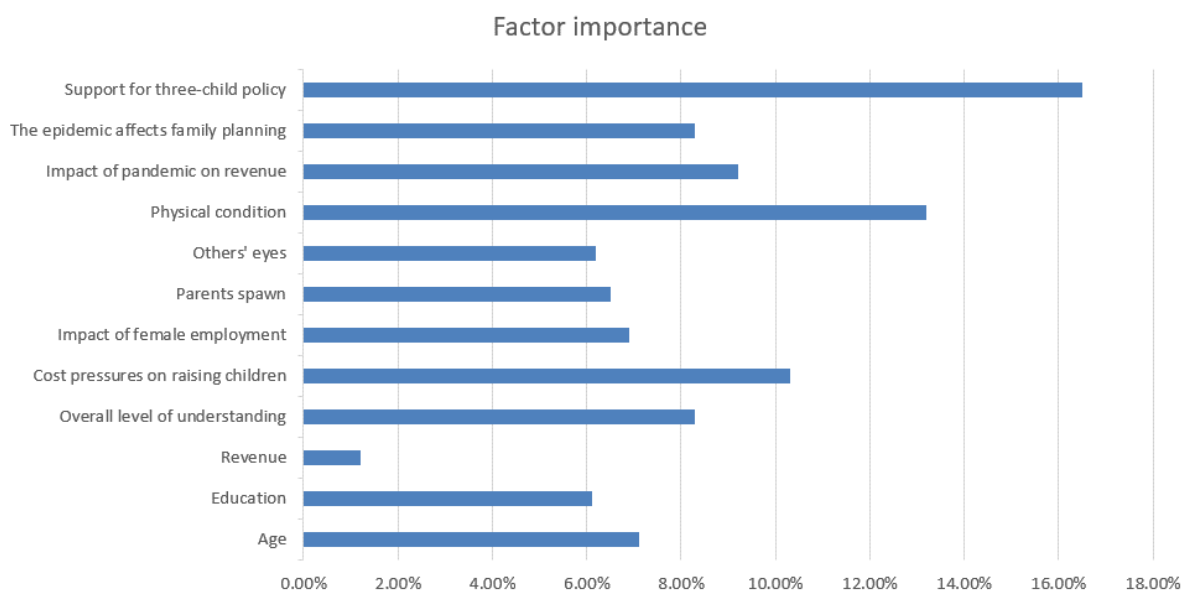


Figure. 6 Factor importance plot under decision tree model

Table. 2 Decision tree model evaluation results

	Accuracy	Recall	Precision	F1
Training set	0.732	0.732	0.734	0.731
Test set	0.825	0.825	0.849	0.832

Decision tree model evaluation results is shown as Table2. The depth of the decision tree model is 10 layers, and the accuracy and precision of the training set and the test set are relatively large, indicating that the decision tree model is good. As can be seen from the factor importance chart, the three factors of supporting attitude towards the three-child policy, age and the influence of epidemic on family birth planning are of great importance, which means they have the greatest impact on people's fertility intention.

2.3. Model Conclusion

In summary, according to the neural network model and decision tree model constructed above, it can be seen that: People's attitude towards the three-child policy is an important factor affecting people's fertility intention. Therefore, it is suggested that the state and relevant government departments should pay more attention to people's attitude and views on the implementation of the three-child policy while increasing publicity, strengthen the implementation of supporting measures, increase people's acceptance of the three-child policy, so as to improve people's fertility intention.

3. Countermeasures and suggestions

Workers are the most basic factor in social productivity, and population growth will promote the development of social productivity to some extent. As we all know, China 's declining fertility rate will lead to the disappearance of the demographic dividend. The implementation of the three-child policy is conducive to easing the aging population, and it will increase the labor force and promote the future development of the country. Therefore, the introduction of the three-child policy is in line with the trend of social development, and it is an urgent measure. And now the most important reason is not "do not want to give birth", but "dare not give birth" and "can not afford to give birth". it is the high cost of fertility and parenting that makes people prohibitive. To sum up, to improve people's willingness to have more children, we need to start from "reducing the cost of childbearing", which mainly includes education, economy, medical treatment and employment.

(1) Increase the number of public childcare institutions and rationally allocate educational resources

With the improvement of the quality of the population, "receiving education" has become a common phenomenon. In the process of the implementation of the "three-child policy", 0-3 years old children how to more affordable access to kindergarten has become a hot topic. At present, most kindergartens in China are private, and the fees are getting higher and higher year by year. It makes it difficult for ordinary families to pay the cost of early childhood education for a child, which greatly discourages people's willingness to have more children. Our country should encourage and support relevant public welfare organizations and enterprises to increase the number of public nursery education institutions. And to promote the early childhood education into the compulsory education stage to reduce tuition and fees is an effective measure to stimulate people to have more children. In addition, the uneven distribution of educational resources is hindering people's willingness to have more children and is also a major social pain point, which mainly targets parents who have already had one or two children. With the middle school enrollment rate at 50 percent, it means that their children are more difficult to go to high school and the competition is fierce, so they don't think about having another child. In addition, in recent years, the "lottery for middle school" resulted in a family of two children in the school area is far away, adding to the burden of parents[5]. Would they want to have another child if they had to worry about the cost of education and the potential distraction of both parties? Therefore, schools should provide more humanized services. For example, Zhejiang Province has implemented the method of "let the children attend close schools", so that it is possible to dispel parents' worries about having more children.

(2) Cut taxes and fees, and provide housing and other economic subsidies

Economy is the most basic factor for a person to survive in this society. Economy is commonly referred to as "money". It is said that "money is not everything but nothing can be done without money". Economy is the most critical and important factor preventing people from having more children. In recent years, the housing prices have skyrocketed, resulting in many people becoming "mortgage slaves". The purpose of buying a house is to create a good living environment for a family. The soaring housing price has increased people's economic burden, so having more children under such a living situation of paying the mortgage is just like a daydream. Therefore, measures taken by the government such as granting housing subsidies to families with a third child, reducing or exempting individual income tax and implementing maternity allowances will help to improve people's willingness to have more children to a certain extent.

(3) Improve the reimbursement rate of pregnancy test and newborn medical treatment

Pregnancy examination is an inevitable project in the early stage of fertility, which includes ultrasound examination, blood lipid examination, liver and kidney function examination and so on, and the cost of a pregnancy examination is not cheap. In the questionnaire survey conducted by our team, nearly 76% of respondents change their plans to have children because they are worried about the pregnancy examination under the epidemic situation. And many couples who want to have children have passed the childbearing age and face many risks of having children at an advanced age[6]. Some of them consider the cost too high, while others are concerned about the causes of errors caused by unregulated inspection agencies. And there are a lot of issues that they have to deal with after the baby is born. Such as prevalence, while improvements in medical technology have reduced death rates, environmental pollution and other factors have increased the risk of disease, especially among newborns with weakened immune systems. Nowadays, the cost of hospitalization is also very expensive, especially in the grade A tertiary hospital, so it is necessary to increase the reimbursement rate of pregnancy examination and newborn medical treatment.

(4) Extend maternity leave and protect women's employment rights and interests during pregnancy and childbirth

Influenced by the concept of "more children, more happiness" in China, and many women also like children, most of them still want to have children. But there are also many problems on women's employment. Nowadays, our society emphasizes equality between men and women, but it has not been fully achieved. We have to admit that the status of men and women in the workplace is not equal, especially for women who have given birth to children. According to the data, nearly 80% of the

respondents believe that women will have great pressure to work after giving birth, and that it is not uncommon for women to have lower working ability and suffer discrimination in the workplace[7]. Therefore, it is important to extend maternity leave for women, to provide paternity leave for men and to implement maternity pay and benefits for women. At the same time, our country should encourage enterprises to hire women who have a third child in proportion and respect female employees who return to work from maternity leave.

4. Conclusion

In this paper, online questionnaire survey and offline field survey in urban and rural areas are conducted for the change on the three-child policy fertility intention of the child-bearing age group in Guangxi after the introduction of supporting measures, and descriptive analysis of the data is carried out by climbing the keyword design questionnaire. Besides, neural network and decision tree are used to analyze the influencing factors of fertility, and some effective conclusions are obtained from the machine learning analysis. It also gives the countermeasures and suggestions under the three-child policy in order to provide the scientific basis for the relevant departments to formulate the fertility policy. In the following research, this paper will focus more on the combination of machine learning and the three-child policy to provide effective suggestions to the national birth policy.

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