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The Construction of a Poverty Return Risk Indicator System under Rural Revitalization: Taking the Poor Households in Guangdong Province

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Abstract: This paper consists a return-to-poverty risk indicator system including indicators such as the per capita annual income of poverty-stricken families, the implementation of policies, and the gender of the head of the household. Using a combination of analytic hierarchy process and fuzzy evaluation method, 50 poor households with registered cards in Guangdong Province in 2020 were taken as the research objects, and quantitative analysis of the index system was carried out. The results show that the per capita annual household income is the most influential indicator, and policy coverage, policy effectiveness, and per capita annual household expenditure also have a significant impact.

Keywords: Rural revitalization; Early-warning of falling back to poverty; Analytic hierarchy process; Fuzzy comprehensive evaluation method

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1. Introduction

Since the 18th National Congress of the Communist Party of China, relying on the strong organizational mobilization and resource allocation capabilities of the Communist Party of China, China has achieved the great goal of eradicating absolute poverty in 2020 and has achieved world-wide dazzling results. General Secretary Xi Jinping emphasized at the 2021 Poverty Alleviation Summary and Commendation Conference that “poverty alleviation is not the end, but the starting point for a new life and new struggle.” Consolidating the victory of poverty alleviation and implementing the effective connection of rural revitalization is inseparable from achieving a stable alleviation of poverty and establishing a long-term mechanism to prevent return to poverty. Therefore, it is necessary to study the risk index system of return to poverty.

As a strong economic province in China, Guangdong Province has achieved good results in poverty alleviation, helping a large number of relatively poor people to achieve poverty alleviation. According to the information provided by the Guangdong Provincial Poverty Alleviation Office, Guangdong Province has achieved 1.615 million relatively poor people out of poverty in the poverty alleviation work, and 2277 relatively poor villages have been removed. Such a large base of poverty alleviation population makes preventing the occurrence of poverty return a major concern. The problem. In recent years, a large number of scholars have established a regional poverty return risk evaluation index system, which serves as an early

warning for the poverty of the poor and marginalized people in the region, and reduces the probability of the poverty-stricken households returning to poverty in the region. This paper takes 50 poverty-stricken households registered and registered in Guangdong Province in 2020 as the research object, and uses empirical analysis methods to construct a 2020 poverty-returning risk indicator system for registered poor households in Guangdong Province, in order to achieve the results of poverty alleviation and rural areas in Guangdong Province.

2. Discussion on the concept of “early-warning of falling back to poverty”

At present, academic circles have continuously enriched the discussion on poverty standards, definitions and root causes. Malpass^[3] established the definition of absolute poverty in the 19th century, pointing out that when a family cannot maintain the needs of food, clothing, housing and other necessities of life, it is in absolute poverty. middle. Runciman^[4] put forward the concept of relative poverty when studying the poverty situation in the United Kingdom, and proposed that poverty is formed in a certain frame of reference comparison, which is a psychological state of human psychology due to the gap between incomes. For absolute poverty, scholars have proposed that the focus of poverty alleviation policies should be to eliminate structural barriers. If it is relative poverty, it should focus on reducing volatility and stabilizing the income of the poor^[2].

In 2020, China has completed the fight against poverty with the goal of eliminating absolute poverty. However, many risks inducing poverty in rural areas still exist, and the total risk of rural households has increased, the level of risk units is diversified, and the coexistence of traditional and non-traditional risks^[8]. Due to the existence of contradictions such as the vulnerability of the main body of poverty alleviation, lack of welfare coverage, insufficient guarantees, and the dual structure of urban and rural areas, the process of consolidating and expanding the results of poverty alleviation will face the threat of poverty return, relative poverty, sudden poverty and hidden poverty^[5]. In addition, gender and age are posing new risks of returning to poverty. Wei Yan and Li Meiqi^[6] conducted a three-stage generalized least squares method and Tobit model to study the health and poverty status of rural women, and found that the situation is not optimistic, and 17.56% of rural women fall into health The possibility of poverty is high. Zhai Shaoguo and Ding Yizhuo^[7] found through research that the current intergenerational economic interaction within rural households can be divided into top-down intergenerational support, two-way intergenerational mutual support, and bottom-up. The intergenerational support model and the three models have a significant impact on alleviating poverty and returning to poverty due to illness. The elderly in rural areas face multiple vulnerabilities such as health, economy and society.

After building a well-off society in an all-round way, China's poverty situation and development conditions will undergo major changes. The implementation of the rural revitalization strategy will provide important support for continuing to promote long-term poverty reduction after 2020^[1]. Further poverty reduction work requires the strong leadership of the Communist Party of China. The speed and scale of poverty reduction in China are unprecedented in the past and present at home and abroad. It is necessary to stop the return to poverty in poverty governance, overcome the fragility of the poverty reduction foundation and the multidimensional nature of the incentives for the return to poverty. Effectively alleviate the risk of poverty-stricken households and marginal households.

3. Index system construction and empirical analysis

Based on the existing research results on the establishment of an index system for preventing poverty return, this article mainly considers the three possible causes of poverty return: family conditions, policy factors, and personal factors. On this basis, the establishment of the 2020 Guangdong Province registration card for

poor households to return to poverty is established. Risk indicator system, and carried out corresponding empirical design and analysis.

3.1. Introduction to research methods

In this paper, in the construction of the 2020 index system for the poverty return risk of the registered poor households in Guangdong Province, the following three methods are mainly used for data collection and processing.

(1) Analytic Hierarchy Process

Analytic Hierarchy Process, abbreviated as AHP, was proposed in the 1970s by a professor at the University of Pittsburgh, an American operations researcher. A multi-scheme optimization decision-making method that decomposes multi-objective decision-making problems into multiple indicators and multiple levels is suitable for solving decision-making problems with hierarchical interlaced evaluation indicators and difficult to quantitatively describe.

(2) Fuzzy Comprehensive Evaluation Method

Fuzzy evaluation method is based on fuzzy mathematics, which transforms qualitative evaluation into quantitative evaluation according to the degree of membership theory, so as to make an overall evaluation of things or objects restricted by multiple factors. It has the characteristics of clear results and strong system, which is suitable for solving various non-deterministic problems. Fuzzy evaluation needs to establish a comprehensive evaluation factor set:

$$U = (u_1, u_2, \dots, u_m)$$

The factor set is an ordinary set composed of various factors that affect the evaluation object. It is represented by U , and u_i is the i -th factor that affects the evaluation object. Then establish a comprehensive evaluation evaluation set:

$$V = (v_1, v_2, \dots, v_m)$$

The evaluation set is a collection of various results that the evaluator may make to the evaluation object, usually represented by V , and v_j is the j -th evaluation result.

The single factor quantification of the factors contained in U can get the single factor evaluation matrix R :

$$R = \begin{bmatrix} R|u_1 \\ R|u_2 \\ \dots \\ R|u_p \end{bmatrix} = \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1m} \\ r_{21} & r_{22} & \dots & r_{2m} \\ \dots & \dots & \dots & \dots \\ r_{p1} & r_{p2} & \dots & r_{pm} \end{bmatrix}$$

In the evaluation work, the importance of each factor is different, and the AHP algorithm can be used to construct a weight set to establish a comprehensive evaluation model:

$$B = D \circ R = (a_1, a_2, \dots, a_p) \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1m} \\ r_{21} & r_{22} & \dots & r_{2m} \\ \dots & \dots & \dots & \dots \\ r_{p1} & r_{p2} & \dots & r_{pm} \end{bmatrix} = (b_1, b_2, \dots, b_m)$$

After the comprehensive evaluation model is determined, the scores of the system and individual indicators can be determined, and the fuzzy factors can be quantified, so that the results can be clearly presented to the decision makers.

3.2. Index construction

Under the guidance of “two no worries, three guarantees,” this article selects the following three dimensions—family factors, policy factors, and personal factors through consulting experts, literature review, field visits, etc., to establish a file for Guangdong Province in 2020 Consider the risk of returning to poverty for poor households in Lika. The details are shown in the following table:

Table 1. Indicators of the early warning system of return to poverty

Dimensionality	Variables	Variable Declaration
A1 family factors	B1_annual_ave_fam_income	Annual per capita household income
	B2_annual_disposable_income	Annual per capita household balance
	B3_family_population	Total family population
	B4_age	The householder age
	B5_householder_gender	The head of the household of gender
A2 policy factors	B6_policy_helpful_assis	Policy effectiveness
	B7_policy_change	Policy continuity is possible
	B8_policy_cover	Policy coverage
	B9_policy_implementation	Policy implementation
A3 personal factors	B10_chronic	Chronic or severe conditions
	B11_bad_habbit_main_labor	Whether there are bad habits in the family
	B12_protect_against_financial_risks	The ability to withstand economic risks

As shown in **Table 1**, based on the suggestions of experts and scholars and the findings and summaries during the field survey, this paper constructs a total of twelve secondary indicators, which are divided into three dimensions: family factors, policy factors, and personal factors, which mainly involve income, expenditure, illness, Policy support and other perspectives.

3.3. Empirical analysis

Determining weights is the first step in empirical design. AHP can better combine existing research results and local actual conditions to achieve scientific empowerment. Therefore, this article uses AHP to determine the weight of various indicators in the 2020 Guangdong Province registration and registration poverty households' poverty risk indicator system. In the research process, the judgement matrix was constructed by designing questionnaires and inviting experts and scholars to score. Five experts with rich experience in poverty alleviation work were mainly consulted, including 3 cadres in the village and 2 front-line workers. There are a total of four well-known scholars in related fields, of which 3 have a doctorate degree and 1 has a doctoral supervisor qualification. Sort the summary results in a single hierarchy, solve the maximum eigenvalues and eigenvectors, and do normalization. The calculation results are shown in **Table 2**.

It can be seen from **Table 2** that the weights of the three dimensions have little difference. The per capita annual income of the family is the most weighted indicator among the family factors. The effectiveness of the policy is the most weighted indicator among the policy factors. Chronic disease is the most important factor among the personal factors. index of. In the consistency test, the consistency test results of the overall dimension and the respective consistency test results of the three dimensions are 0.0011, 0.00269, 0.00033, and 0.00147 respectively, which all meet the condition of $CI < 0.10$ and have good consistency. Therefore, the weight values shown in Table 3-2 can be used for further calculation of fuzzy evaluation.

Table 2. Summary of scoring by experts and scholars on the early warning system of poverty return

Dimensionality	Variables	Di_Weight	Va_Weight	Weight
A1	B1	0.37	0.31	0.11
	B2		0.28	0.10
	B3		0.17	0.06
	B4		0.14	0.05
	B5		0.1	0.04
A2	B6	0.32	0.29	0.09
	B7		0.28	0.09
	B8		0.22	0.07
	B9		0.21	0.07
A3	B10	0.31	0.47	0.15
	B11		0.32	0.10
	B12		0.21	0.07

After determining the weights of various indicators in the poverty return risk index system of the registered poor households in Guangdong Province in 2020, the fuzzy evaluation method is used to construct the evaluation set, and the evaluation set is set to 4 levels, $v_1 = 100$, $v_2 = 80$, $v_3 = 60$, $v_4 = 40$, which respectively represent that the indicators have a very large, a large, a large, and a light impact on the formation of the risk of returning to poverty; then the fuzzy evaluation object factor set U is established, based on field interviews The acquired data is single-factor quantification of the factors contained in U, and then combined with the index weights obtained by the AHP algorithm to obtain the evaluation vector of each index. After corresponding calculations with the evaluation set, the problem is defuzzified. The results are shown in the figure below:

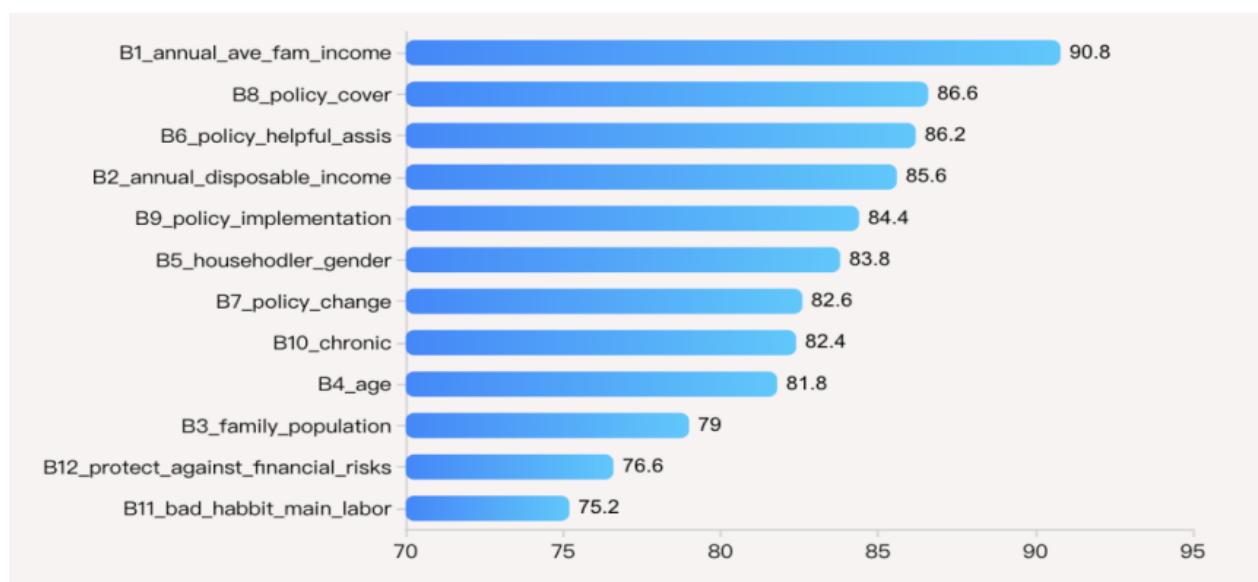


Figure 1. Index fuzzy evaluation score

As shown in **Figure 1**, the fuzzy evaluation results of 12 indicators in this area show that the per capita annual income of households has the greatest impact on preventing poverty, with a score of 90 or more,

which should be given special attention; policy coverage, policy effectiveness, and household per capita annual expenditure scores A score of 85 or more. This part of the indicators has a great impact on the formation of the risk of poverty-returning to poverty for the registered poor households in Guangdong Province in 2020, indicating that the actual situation of these indicators in poverty-stricken families is very important and requires great attention; the degree of policy implementation and the gender of the head of the household, Policy sustainability, disease status, and age of the head of the household above 80 points, indicating that this part of the index has a great impact, and its importance cannot be ignored; the family population, whether there are bad habits, and the ability to withstand economic risks are between relatively influential and very influential, it shows that this part of the index is not as large as other indexes in preventing poverty in the place, but it still needs attention. The scores of all indicators are above 70, indicating that the 2020 Guangdong Province registration card poor households return to poverty risk indicator system is representative and scientific, and it is capable of preventing the poverty return risk of the registered poor households in Guangdong Province in 2020. Practical value.

4. Conclusions and advices

In 2020, China's poverty alleviation work has come to an all-round end and achieved initial success. In order to effectively link the revitalization of the countryside and realize the great rejuvenation of the Chinese nation, we must do a good job of preventing and resolving the risk of returning to poverty and preventing the occurrence of returning to poverty. This is also the essential manifestation of the Communist Party of China and the people always standing together and working for the well-being of the people. This paper combines existing research results and constructs an indicator system through a series of measures such as consulting experts and scholars. The indicator system is weighted according to the suggestions of experts and scholars, and effective calculations are made based on the actual feedback data of poor households in the archives. One indicator is particularly valued, 3 indicators are highly valued, 5 indicators are highly valued, and 3 indicators are moderately valued.

The scientificity of the research methods in this paper and the validity of the data sources guarantee the value of the conclusions of this paper. The scientificity of the research methods used in the empirical analysis of the thesis and the validity of the data sources are both important. In terms of research methods, it is necessary to consider and quantitatively evaluate the problems; in terms of data sources, it is necessary to refer to the opinions of experts and scholars. To ensure the objectivity and completeness of the data through field research and other methods. In the research process, this paper combines AHP and fuzzy evaluation method, consults a large number of first-line experts and well-known scholars, and obtains the data of the registered poor households in Guangdong Province in 2020 through questionnaire surveys and on-site interviews, so as to construct scientific and effective risk prevention The index system uses mathematical methods to carry out rigorous calculations to realize the defuzzification of the index system, and at the same time carry out certain comparative analysis. Based on the research results of this article, this article puts forward the following suggestions for the work of preventing poverty return of poor households in Guangdong Province in 2020:

(1) Strengthen the leadership role of grassroots party organizations in poverty alleviation work. Basic-level party organizations are connected and integrated with the people. They can find practical problems in the front line and effectively overcome the difficulties and pain points of the poor by virtue of their strong resource allocation and personnel organization capabilities. Strengthening the leadership role of grassroots party organizations in poverty alleviation is to improve the leadership and work efficiency of grassroots

party members and cadres, and to better integrate the ideals of solid poverty alleviation with the status quo of the poor. This will deepen poverty alleviation and develop rural areas. The revitalization work injects strong vitality.

(2) Focus on the annual income per capita of the family. In the research of this article, the family's annual per capita income is the most important and requires special attention. According to the international poverty line per capita daily income of 1.9 US dollars announced by the World Bank in early October 2015 and taking into account the factor of purchasing power parity, the warning line should be set at the level of 4,000 yuan per capita annual household income. Of families implement a high-level early warning of return to poverty, and through targeted measures such as cultivating labor skills and implementing policy assistance to solve practical problems thoroughly and effectively, at the same time improve the actual ability to help people, and achieve skills enhancement and management progress.

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