

Study on the Characteristics of Poverty in Jingyu County of Jilin Province and the Countermeasure of Targeted Poverty Alleviation

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Keywords: Poverty characteristics; targeted poverty alleviation; Jingyu County

Abstract: At present, China's poverty alleviation has entered an important stage of "tackling the country", and it is necessary to realize the regional poverty alleviation and the need for more refined poverty alleviation ideas and countermeasures. At present, most research on poverty and poverty alleviation use the county or above the region as a research unit, which cannot accurately reveal the poor regional differences. This paper takes Jingyu County as the research object, in this paper, we take the township as the research unit, establish the index system from the three dimensions of nature, economy and society, use the spatial interpolation to analyze the poverty characteristic of Jingyu County, and uses the geography detector to detect the dominant factors of poverty. The study found that the seven factors, such as slope and elevation, are the dominant factors of poverty in Jingyu County. Jingyu County poverty has obvious geographical differentiation. There are four types of impoverished areas: natural environment restriction, resource restriction, economic location restriction, the overall quality of labor restrictions. Based on the above-mentioned regional types, the corresponding poverty alleviation measures are put forward to provide suggestions for improving the effectiveness of targeted poverty alleviation.

1. Introduction

In 2013, General Secretary Xi Jinping proposed "precise poverty alleviation" when he visited Xiangxi. Since then, the State Council and local governments at all levels have stepped up poverty alleviation efforts and implemented the "precise poverty alleviation" strategy, which has achieved remarkable results in poverty alleviation. By the end of 2016, the number of rural poor in China had decreased from 82.49 million to 43.35 million. However, the characteristics of China's rural poverty-stricken areas with wide distribution, relatively concentrated space and deep poverty have not been fundamentally changed [1]. Rural poverty, poverty alleviation and development, and precise poverty alleviation have always been the focus of social attention, as well as research hotspots in geography, sociology, management, and economics. The initial research on poverty in the academic community was limited to basic survival needs, and the poverty-stricken areas were often identified as rural per capita net income [2-3]. In recent years, it is generally believed that it is difficult to accurately identify poor people based on income indicators, and it is difficult to reflect the characteristics of poverty. Foreign scholar Sen studied "capability poverty" and thought that the income gap is the external performance of people's ability to obtain survival income [4] His theory has led to new thinking on the measurement of poverty in the academic world. The research on multidimensional poverty measurement methods has become the focus of international academic research.

Some scholars in China have assessed poverty from three aspects: economic, social and natural. At the spatial scale of the study, most of the existing research is based on the administrative areas of counties and counties, and the spatial distribution characteristics of the poor are analyzed from a macro perspective [5-6]. From the research content, the main focus is on rural poverty measurement model [7], rural poverty identification [8] and rural poverty spatial distribution pattern [9-10]. In fact,

the current rural poverty situation in China is no longer caused by the general poverty caused by the country's economic backwardness, social system and imperfect policies, but regional poverty caused by regional factors such as poor resource environment and backward production conditions [11]. The study of poverty from macroeconomic scales such as provinces and counties is difficult to reflect the poverty nature and spatial distribution pattern within the county, and it is unable to meet the precise requirements of poverty alleviation targets in precision poverty alleviation. This experiment takes Jingyu County Poverty Alleviation Office of Jilin Province as the research object, takes the township as the research unit, studies the poverty characteristics of Jingyu County from a multi-dimensional perspective, and combines spatial data such as ArcGIS to explore the internal factors leading to poverty. On this basis, the strategy of implementing the "precise poverty alleviation" strategy is proposed, which is expected to provide theoretical basis and decision-making reference for "precise poverty alleviation" work. Jingyu County's poverty alleviation pilot work has important theoretical guidance and practical significance for precision poverty alleviation in the northeast alpine mountainous areas.

2. Data sources and research methods

2.1 Research area overview

Jingyu County is located in the southeast of Jilin Province, upstream of the Songhua River. The county governs 8 townships with a land area of 3094.36 square kilometers and a county boundary line of 587.71 kilometers. By the end of 2015, the total production value of Jingyu County was 603.228 million yuan, the resident population of rural areas was 60,331, the disposable income of urban residents was 18,070 yuan, and the disposable income of rural residents was 7,084 yuan. The west, south and north sides of Jingyu County are surrounded by the Longgang Mountains of Changbai Mountain. They belong to the alpine mountainous area on the west side of Changbai Mountain. The forest area in the county accounts for 84.85% of the total land area. In 2015, the State Council issued 592 national poverty alleviation and development key counties, and Jilin Province accounted for 8 of them, including Jingyu County. There are 55 poverty-stricken villages in the county, with 7,329 poor households and 13,660 poor people. At the end of 2015, the incidence of poverty in Jingyu County was 10%, far higher than the national level of 4.5%. In general, Jingyu County has a wide range of poverty and a deep degree of economic development.

2.2 Data Sources

Taking 8 towns and townships in Jingyu County as the research unit, the basic data of rural population, rural poor population, rural working population and population education degree of 111 administrative villages in Jingyu County were obtained through the 2016 assessment of precision poverty alleviation effectiveness. The data on cultivated land area, grain output, and infrastructure of each township are provided by Jingyu County Government. The DEM data is derived from the Geospatial Data Cloud website and processed by ArcGIS software to obtain altitude elevation and ground slope. Then the relevant data is superimposed with Jingyu County vector data, and the natural geospatial data is obtained through spatial analysis.

2.3 research method

2.3.1 Indicator system

The measurement of poverty from a single dimension does not reflect the intrinsic driving mechanism of the overall characteristics of poverty. This paper constructs indicators from the three dimensions of nature, economy and society (Table 1) to identify the poverty-stricken factors in Jingyu County, with the incidence of poverty as the cause. Variables, the indicators in Table 1 are independent variables, and the correlation degree between each factor and the incidence of poverty is obtained through the analysis of person correlation. The dominant factors and mechanism of poverty in Jingyu County are detected from the quantitative relationship. Climate and topography are

important natural factors affecting regional poverty. Considering the availability of data and the actual situation of the study area, the climate change within the county is not much different. Therefore, the natural dimension selected in this paper only includes the slope and elevation of the ground, which is used to characterize the natural basis of regional development capability. The higher the altitude, the greater the slope, the higher the degree of restriction on economic development, and the higher the degree of potential poverty. The economic indicators mainly represent the regional economic strength from the location, transportation and resource richness. Social indicators represent the state of infrastructure, the comprehensive capabilities of the workforce and the quality of life.

Tab. 1 The Index System of Three - dimensional Poverty in Jingyu County

type	Poverty Geographic Identification Metrics	Code
natural	Ground slope	X ₁
	altitude	X ₂
economic	Per capita cultivated area	X ₃
	Unit planting area grain yield	X ₄
	Proportion of rural employees	X ₅
	Distance to the center of the county	X ₆
society	The proportion of townships and towns benefiting from tap water	X ₇
	The proportion of townships and towns	X ₈
	The number of broadband villages accounts for the proportion of townships	X ₉
	Population illiteracy rate	X ₁₀
	Sick population ratio	X ₁₁
	Proportion of male and female population	X ₁₂

2.3.2 Spatial interpolation

The spatial interpolation method is a method of deriving the value of any point in the range of the region according to the spatial data of the known discrete points. The interpolation result generates a continuous surface, which is often used for the sample points not covering the entire region. In this paper, the Kriging spatial interpolation method is used to analyze the spatial distribution of various factors. Kriging spatial interpolation considers the spatial distance relationship between the predicted point and the adjacent sample point, and also considers the positional relationship between the participating sample points. The estimation result effectively avoids the occurrence of systematic errors and is more realistic than the traditional method.

2.3.3 Natural breakpoint method

Natural breakpoint categories are based on natural groupings inherent in the data. By identifying the classification intervals, the similar values are most appropriately grouped and the differences for each category are maximized. The natural breakpoint method is a method of clustering and grading according to the inherent law of data, which can effectively avoid human interference. In this paper, the natural breakpoint method is used to classify various factors, which is convenient for the next step to detect the spatial differentiation characteristics and dominant factors of poverty by means of geographic detectors.

2.3.4 Geographic detector

Geo-detectors are a new statistical method for detecting spatial differentiation and factor analysis. The basic idea is that the research area consists of several sub-areas. If the sum of the variances of the sub-areas is less than the total variance of the areas, there is spatial differentiation; If the spatial distribution of the two variables tends to be consistent, there is a statistical correlation between the two^[12]. The spatial differentiation of the incidence of poverty in Jingyu County was analyzed by introducing the geo-detector method and ArcGIS spatial superposition technology.

The specific algorithm is as follows:

$$q = 1 - \frac{\sum_{i=1}^n N_i \sigma_i^2}{N \sigma^2}$$

Where: $i=1, 2, 4\dots, n$ is the partition of factor A, in this context, the number of samples in type i (corresponding to one or more sub-regions) of factor A; N is the number of samples in the entire study area, σ^2 is the deviation of the entire area. q The value range is $[0, 1]$. The larger the value of q is, the stronger the spatial differentiation of poverty incidence rate is, and the stronger the factor A is to determine the incidence of poverty. When q is 0, it indicates that factor A has no effect on the spatial distribution of poverty. When q is 1, it indicates that factor A completely controls the spatial distribution of the incidence of poverty.

3. Analysis of Poverty Characteristics and Driving Mechanism of Jingyu County

3.1 Spatial distribution of poverty incidence in Jingyu County

Considering that the sample data cannot cover the entire study area, in order to more scientifically describe and study the spatial distribution and change characteristics of the incidence of poverty, ArcGIS is used to interpolate the incidence of poverty in the study area. The incidence of poverty in Jingyu County (Figure 1) is semi-annular. The high incidence of poverty is distributed in Huayuankou Town in the southeast corner, Naerbang Town in the north and Jingshan Town, Mengjiang Township and Longquan Town in the west, and the incidence of poverty in the central and eastern regions is relatively low. Among them, except for Jingyu Town and Chisong Town, the incidence of poverty in other towns and towns is above 0.10, which is higher than the county average. The highest incidence of poverty was in Mengjiang Township (0.21) and the lowest was Jingyu Town (0.02). There are significant differences in the incidence of poverty among the eight townships in Jingyu County. By superimposing the incidence of poverty in Jingyu County and the topographic map, it can be clearly seen that the higher the altitude, the higher the incidence of poverty. Therefore, further exploration of the dominant factors and driving mechanisms of rural poverty regional differentiation can effectively improve the scientific nature of precision poverty alleviation.

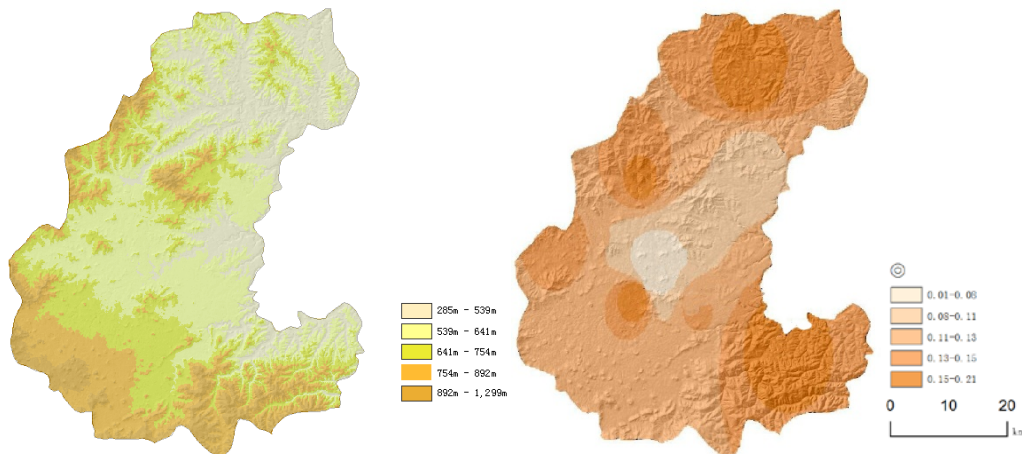


Fig. 1 Spatial distribution of topography and the incidence of poverty in Jingyu County

3.2 Correlation analysis of factors influencing poverty

In order to diagnose the influencing factors of poverty, the correlation between each indicator and the incidence of poverty was analyzed (Table 2). A positive correlation indicates that this factor leads to regional poverty, and a negative correlation is a factor that alleviates regional poverty. From the results of the significance level test, the slope, altitude, per capita arable land area, distance to the county center, population illiteracy rate, and the proportion of sick and disabled people were significantly positively correlated with the incidence of poverty. There was a significant negative correlation between the grain yield per unit area, the proportion of rural employees and the incidence of poverty. The tap water benefit village accounts for the proportion of townships and towns, the

cable TV village accounts for the proportion of towns and towns, and the broadband village accounts for the proportion of townships. The significance level of these three indicators is greater than 0.05. Although it has a certain correlation with the incidence of poverty, it is weak and persuasive. Chance. It can be seen from the correlation analysis that the natural conditions such as slope and altitude, the distance to the center of the county, the education level and quality of the population, and the health status of people are significant poverty factors in Jingyu County. The abundance of natural resources such as grain output per unit area and the ratio of male to female population are significant poverty alleviation factors in Jingyu County. Natural conditions have fundamentally restricted the development of Jingyu County, leading to regional poverty, and the backward social conditions have further aggravated the development trend of poverty. The economic factor is an effective means to alleviate poverty.

Tab. 2 Pearson correlation between the indicators and the incidence of poverty

	X1	X2	X3	X4	X5	X6
Correlation coefficient	0.36*	0.68*	0.52*	-0.58**	-0.713*	0.19*
Significant level	0.04	0.03	0.02	0.01	0.02	0.04
	X7	X8	X9	X10	X11	X12
Correlation coefficient	-0.30	-0.21	-0.21	0.921**	0.947**	-0.826*
Significant level	0.06	0.07	0.62	0.00	0.00	0.01

Note: * indicates that the correlation is significant on the 0.05 layer, and ** indicates that the correlation is significant on the 0.01 layer.

3.3 Analysis of the leading factors of poverty

Firstly, the natural breakpoint method is used to stratify the 12 indicators such as altitude, slope, per capita arable land area, and grain yield per unit area, and the incidence of poverty. The sample data is then imported into the geo-detector software for calculation. The decisiveness (q value) of each indicator factor on the incidence of poverty is shown in Table 3. It can be seen that the altitude (x2) has the highest q value, followed by the slope (x1), indicating that the natural condition is spatial differentiation of poverty in Jingyu County. The most important factor. In addition, per capita arable land area (x3), unit planting area grain yield (x4), distance to county center (x6), population illiteracy rate (x10), and proportion of sick population (x11) are all determined to be 0.5. The above. Combined with the correlation analysis, the seven indicators including slope, altitude, per capita arable land area, grain yield per unit planting area, distance to county center, population illiteracy rate and disability population ratio were determined as the leading factors of poverty in Jingyu County. Terrain has a significant impact on regional climate, hydrology, soil type and biological distribution, which greatly affects the production potential and utilization efficiency of land resources, thus affecting the structure and mode of agricultural production. The northwestern, western and southeastern mountainous areas of Jingyu County are not conducive to the development of mechanized production and scale agriculture, and the incidence of poverty is generally high. The mountain area of Jingyu County is as high as 80%, which restricts the construction of infrastructure such as transportation and hinders economic exchanges with the outside world. The per capita arable land area reflects the abundance of regional agricultural production resources. However, according to the correlation analysis, the per capita arable land area is negatively correlated with the incidence of poverty. The per capita arable land area in Jingyu County is more in the north and south, and the distribution in the central part is less (Fig. 2c), which is roughly consistent with the distribution of poverty incidence. Although Huankou Town and Mengjiang Township are rich in cultivated land resources, due to the high mountainous land, the quality of cultivated land is not high, so the output rate of cultivated land is low and the incidence of poverty is high. This can be seen from the spatial distribution of grain yield per unit of planted area. Jingyu Town has less cultivated land resources per capita, but because it is located in the center of the county, the terrain is flat, modern agriculture is developed, economic crops are planted, and land use efficiency is high, so the poverty rate is low. The distance to the center of the county is an important indicator reflecting the location of the

township. The closer to the county, the higher the economic radiation of the county, and the better access to medical and educational infrastructure services. The incidence of poverty basically expanded from low too high in the county (Fig. 1). The incidences of poverty were far away from Naerhong Town, Huayuankou Town, Jingshan Town, Sandaohu Town and Longquan Town, which are far from the center of the county. Higher than the county average. The illiteracy rate and the proportion of sick and disabled people are important indicators reflecting the overall quality of the workforce. The illiteracy rate and the sick and disabled population in Jingyu County are mostly distributed in the northeast, west, and southwest mountainous areas, which are basically consistent with the distribution of poverty incidence. The overall quality of the labor force is high, the employment rate is high, and the incidence of poverty is correspondingly low.

Tab. 3 Determination of index on poverty in Jingyu

	x1	x2	x3	x4	X5	X6
q	0.978	0.982	0.666	0.770	0.365	0.650
	X7	X8	X9	X10	X11	X12
q	0.317	0.150	0.021	0.919	0.812	0.459

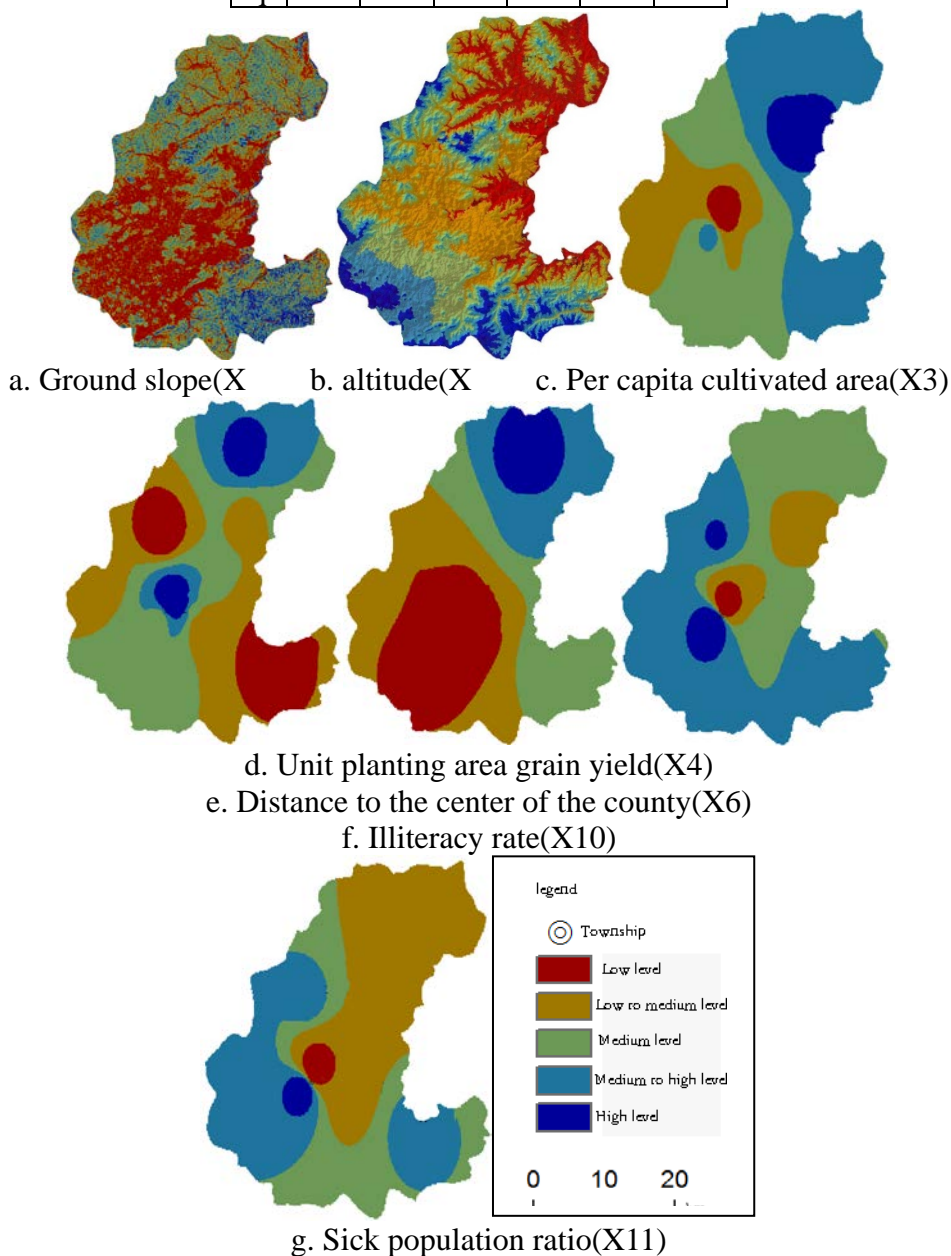


Fig. 2 the dominant factors of poverty in Jingyu County

3.4 Impoverished geographical classification

Based on the above analysis, the poverty of Jingyu County is the result of a combination of factors, and there are obvious regional differences. Therefore, in order to effectively implement accurate poverty alleviation, it is necessary to classify each region according to the mechanism of poverty, so as to target treatment and local policy. (1) Natural environment restricted type. The limits of natural resources in such areas are significant. The terrain is fluctuating, and it is difficult to develop cultivated land due to the influence of slope and altitude. It is difficult to carry out mechanized agricultural production, carry out agricultural scale operation, and the agricultural production mode is backward. It includes Naereng Town in the north, Jingshan Town in the west, Longquan Town, Mengjiang Township in the southwest and Huayuankou Town in the southeast. (2) Resource-restricted type. For areas where agriculture is the main mode of production, agricultural income is the main source of income for farmers, and the amount of cultivated land resources directly affects people's living standards. The richness of resources in such areas is the main factor determining the level of poverty, including Longquan Town, Jingshan Town, Sandaohu Town and Naerhong Town. (3) Economic location restrictions. From the above analysis, the farther away from the county center, the higher the incidence of poverty. This type of area includes Naereng Town, Jingshan Town and Huayuankou Town. The county center has more employment opportunities and better public service facilities in the region. The income of farmers in the towns and villages around the county is more extensive than other towns and towns. (4) The comprehensive quality of labor force is limited. The comprehensive quality of the workforce includes not only the cultural quality of the workforce, but also the physical quality. The education level and health status of the labor force are important factors affecting the employment rate. In addition to Jingyu Town, the illiteracy rate of the other seven townships in Jingyu County is generally high, especially in Mengjiang Township, where the illiteracy rate and poverty rate are the highest. Due to its better medical facilities and services, Jingyu Town has a far lower proportion of sick and disabled people than other towns and villages, and the overall quality of the working population is relatively high. Except for Jingyu Town, the poverty alleviation development of the other seven townships is limited by the comprehensive quality of the labor force.

4. Jingyu County's Countermeasure for Poverty Alleviation

Through the analysis of the poverty characteristics and poverty formation mechanism of Jingyu County, combined with the actual situation of different regions, this paper puts forward the poverty alleviation countermeasures according to the development potential of the region.

4.1 Natural environment restricted type

Naturally restricted areas usually do not have the advantage of economic development. Jingyu County is more than cold and mountainous, and it is not easy to cultivate. If the scope of cultivation is over-expanded, it will have an adverse impact on the ecological environment and form a vicious circle of “farmland expansion—ecological destruction—declining the quality of cultivated land”, thereby increasing poverty. Therefore, the economic development of mountainous areas must adhere to the development of characteristic agriculture on the one hand because of the mountain. On the other hand, it is necessary to implement the basic national policy of “saving resources and protecting the environment” and building beautiful villages. Implement an ecological compensation mechanism to develop the ecological industry into a pillar industry in poverty-stricken areas. For areas with particularly poor natural populations and scattered distribution, in accordance with the principle of favorable living and production, appropriate external migration policies should be adopted to promote population agglomeration.

4.2 Resource restricted

In areas with strong water and soil resources constraints, the construction of farmland water conservancy facilities will be strengthened, and advanced engineering techniques and planting

techniques will be used to improve the output efficiency per unit area of land. Promote village and town planning and land remediation, promote the rational layout of villages and towns, and improve the efficiency of water and soil resources utilization. At the same time, actively guide the export of labor, reduce the pressure on resource utilization, and broaden the income sources of farmers.

4.3 Economic location limited

The foreign economic relations between towns and towns far from the center of the county are relatively weak. Such areas should focus on improving the transportation network, improving road grades, and enhancing the connection between towns and villages. At the same time, strengthen the construction of village and town infrastructure and public service facilities. In the towns and towns far from the center of the county, the public service network is built by taking a town with a better economic development as an important node to improve the quality of people's livelihood in the poverty-stricken areas.

4.4 Labor quality comprehensive type

In areas restricted by the level of labor education, poverty alleviation is focused on "helping wisdom". Adhere to the "youth education" and "vocational training" legs. On the one hand, focus on improving the quality of basic education. On the other hand, strengthen adult vocational skills training, guide farmers to work outdoors and become self-reliant. For the disabled population with no labor ability and weak labor ability, improve the financial subsidy and guarantee mechanism, and the government will be the bottom.

5. conclusion and discussion

This paper takes the towns and villages of Jingyu County in the northeast high-altitude mountainous area as the research unit, and uses ArcGIS spatial analysis technology to identify the poverty-stricken characteristics of Jingyu County from the microscopic point of view, and analyzes the poverty-stricken factors of Jingyu County from the three dimensions of nature, economy and society. Using geo-detectors to detect the dominant factors of impoverishment. The research shows that the impoverishment of Jingyu County has obvious regional differentiation, and there are four types of impoverished regions: natural environment restriction, resource restriction, economic location restriction, and labor comprehensive quality restriction. Targeted poverty alleviation strategies were proposed for different geographical types. The natural environment restriction type should mainly adopt the poverty alleviation mode of relocation and ecological compensation. For resource-restricted types, village and town planning and labor export are the main poverty alleviation models. The poverty alleviation model in economically restricted areas is mainly to improve the infrastructure construction such as communication and transportation. Labor-restricted regional basic education construction and skills training are the key to poverty alleviation. Townships and towns are the basic unit of regional differentiation. The research object of townships and towns as the space for impoverishment is the requirement of implementing poverty alleviation strategy innovation and policy transformation, which is conducive to scientifically grasping the characteristics of impoverishment and implementing differentiated poverty alleviation policies.

Limited to the difficulty of data acquisition, the poverty measurement index system established in this paper has more social indicators, but the natural indicators are insufficient, which has an adverse impact on accurately identifying the poverty characteristics of Jingyu County. This paper mainly analyzes the spatial distribution characteristics of poverty in towns and villages in Jingyu County, and only reflects the breadth of poverty in the region. However, it has not conducted in-depth research on the poverty level of poverty-stricken villages under the jurisdiction of towns and villages, and has not included the poverty of Jingyu County into the background of poverty-stricken counties in Jilin Province. Medium, thus the lack of horizontal comparative analysis.

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