

## **Analysis and Evaluation of National Minimum Living Standard Guarantee from the Perspective of Economic Geography**

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**Abstract:** *The minimum living allowances for residents has received extensive attention. Since the reform and opening up, China's economic level has developed rapidly and the gross national product has continued to grow. We are steadily moving on the road of socialism. In order to realize a comprehensive well-off society at an early date, the State Council issued the "Notice on Establishing a System of Urban Residents' Living Security in the Country" in 1997, which is the beginning of the current low-income policy. It can be seen that studying and predicting changes in the amount of subsistence allowances is of great significance for understanding national policies and national economic conditions. In this paper, we use multivariate linear regression analysis, Martin method to calculate poverty line, factor analysis, cluster analysis and other methods to analyze the subsistence allowances of each year in each region of the country based on the operation of SPSS software, and establish a mathematical model to predict the minimum living security standards. Studies have shown that the standard of subsistence allowances is related to various economic indicators and unemployment. The criteria for studying subsistence allowances should be considered separately in urban areas and rural areas in first-tier cities and other regions.*

**Key words:** *Multiple linear regression analysis; Martin method for calculating poverty line; Factor analysis; Cluster analysis; Economic geography*

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### **I. Introduction**

Since China officially began to implement the subsistence allowance policy in 2004, the subsistence allowance policy has been widely concerned by the people. The minimum living allowance is a minimum living guarantee for the low-income group and an important way for the party and the government to improve the social security system<sup>[1]</sup>. Implementing the subsistence allowance policy is also an important step in building a comprehensive well-off society in China, which is conducive to promoting social equity and achieving common prosperity. However, in the process of policy implementation, there are still some real problems. Which part of the subsistence allowance is the target? Is the subsistence allowance in each region consistent? Solving such problems and eliminating the errors and setbacks in policy practice is very important. Patience and longer time. In recent years, relevant research in China has been continuously carried out, new achievements have emerged, and specific guidelines have been improved. The implementation of the minimum living security policy has become more effective, and this article hopes to be able to make a certain contribution to the research.

Judging from the effect of the implementation of the subsistence allowance policy, there are still some problems to be solved, which have been slightly mentioned above. In fact, these issues involve the accuracy and rationality of implementing policies. In recent years, the slogan of "targeted poverty alleviation" proposed by the Chinese government has been put forward in response to the situation in which the implementation of policies is not very satisfactory. The research we have done now can not only provide basic decisions for social welfare theory, but also implement for the government. Provide data support in the process of policy, better promote the effect of the subsistence allowance policy, further eliminate the chaos of low-income for private, bring protection to those who really need it, and truly implement policies to benefit the people.

### **1 Research area and research methods**

#### **1.1 Data source**

The security system for low-income families is affected by the price of the necessities of the residents and the living standards of the people. In recent years, with the changes in the prices of residents' daily necessities and the improvement of people's living standards, the "standard of minimum living guarantee" has

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fluctuated. Through the relevant data of the statistical yearbook published by the National Bureau of Statistics, this paper determines the number of residents with minimum living allowance, the number of people participating in medical insurance, the number of unmarried persons, the number of unemployed, per capita food expenditure, employed population, per capita disposable income, household consumption, and per capita consumption expenditure since 2012 to 2016.

Due to the different levels of economic development in different regions of the country, the price levels in different regions are different. The economic level in remote areas is relatively backward, and the per capita income level is lower than that in developed regions. However, the overall economic level of the country is developing at a rapid pace. Goods with higher prices in the region are also shipped to various places for commercial sales, which has led to the trend of price growth and has not fallen. In some areas, low-income levels have to cope with high-price markets, so there are certain differences between rich and poor in different regions. The indicators of subsistence allowances are also inconsistent, so that the indicators selected based on the data of a single region can only truly reflect which indicators of the local subsistence allowances are mainly affected by the indicators, not representative and universal, so this paper needs to adopt the national average data to reflect the status of indicators in different years.

## 1.2 Problem Analysis

According to the statistical software SPSS, the number of unemployed (10,000 people), per capita food expenditure (100 million yuan), per capita disposable income (yuan), household consumption level (yuan) and per capita consumption expenditure (yuan) were determined by means of simple correlation analysis.

The funds required for subsistence allowances are included in the budget by the local people's governments at all levels. The "National minimum living allowance" discussion triggered by the economist Jinglian Wu once again pushed the minimum living security that China is working to cover urban and rural residents to the public opinion. At the front desk, however, it is not difficult to find out that the difficulty of subsistence allowances is the capital channel for subsistence allowances. Therefore, the annual financial allocation of the state is limited, and the number of subsistence allowances has become a key indicator. Regarding the number of subsistence allowances, the number of subsistence allowances across the country has generally shown a steady trend in the past decade. The number of residents with minimum living security is an important indicator reflecting the "standard of minimum living guarantee". According to the correlation between other indicators and the strength of weakness, the correlation between other indicators and the "standard of minimum living guarantee" can be judged.

In the simple correlation analysis of SPSS software, the Sig value reflects the level of significance of the correlation between the two indicators. The lower the Sig value, the more significant the correlation between the two indicators. According to the calculation results, the significant level of the number of unemployed persons and the minimum living allowance of residents is 93%. Similarly, the per capita food expenditure, per capita disposable income, household consumption level and per capita consumption expenditure are significantly related to the minimum living allowance of residents. When the value of Sig is small, the correlation between indicators is more significant. In order to facilitate the analysis and model establishment later, the first five indicators with small Sig values are selected as the main indicators for calculating the "minimum living allowance". They are the number of unemployed (10,000 people) and per capita food expenditure (100 million yuan), per capita disposable income (yuan), household consumption level (yuan) and per capita consumption expenditure (yuan).

## 1.3 Research methods

### 1.3.1 Related data

According to Martin's method, the food poverty line (ZF) is first calculated, and then the Engel coefficient is used to calculate the low poverty line and the high poverty line. This article cites the five-year data of the Liaoning Province Statistical Yearbook from 2012 to 2016. The specific data is shown in Table 1.1.

years	Engel coefficient (%)	Food consumption of low-income people (months/kg)	Food consumption expenditure of low-income people (month/kg/yuan)
2012	35	25.34	329.13
2013	32.2	23	293.25
2014	28.3	25.23	277.67
2015	28.3	24.54	280.52
2016	27.6	25.42	343.26

**Table 1.1** Urban related data of Liaoning Province 2012-2016

**1.3.2 Determine the function**

First calculate the food poverty line. Determine the monthly food demand for 20% of the lowest-income population to meet nutritional standards:

years	Food consumption of low-income people (months/kg)
2012	25.34
2013	23
2014	25.23
2015	24.54
2016	25.42

**Table 1.2** Food consumption of low-income people in 2012-2016 (months/kg)

Convert this amount of food into a monetary value, which is the food poverty line (ZF):

years	Food consumption expenditure of low-income people (month/kg/yuan)
2012	329.13
2013	293.25
2014	277.67
2015	280.52
2016	343.26

**Table 1.3** Food consumption expenditure of low-income people (month/kg/yuan)

Calculate the low poverty line. According to Martin Law, the low poverty line is equal to the food poverty line (ZF) plus the minimum non-food expenditure<sup>[2]</sup>. The formula for calculating the minimum non-food expenditure (S<sub>2</sub>) is:

$$C = a + b \ln(W/S) \tag{1}$$

$$S_2 = S_1(1-a) \tag{2}$$

Where C is the Engel coefficient, W is 20% of the per capita consumption expenditure of the lowest income group, and S is the minimum food consumption expenditure to meet the needs of life. The coefficient a, b is obtained by regression analysis. By referring to the calendar year data of W and S in the Liaoning Province Statistical Yearbook, it is calculated that a is equal to 0.5. The minimum non-food expenditure is calculated based on the ratio of the minimum non-food expenditure (S<sub>2</sub>) to the minimum food expenditure (S<sub>1</sub>). The food poverty line plus the minimum non-food expenditure is the low poverty line.

years	Food consumption expenditure of low-income people (yuan/month)	Non-food consumption expenditure for low-income people (yuan/month)	Low poverty line (yuan/month)
2012	329.13	164.565	493.7
2013	293.25	146.625	439.9
2014	277.67	138.835	416.5
2015	280.52	140.26	420.8
2016	343.26	171.63	514.9

**Table 1.4** 2012-2016 Low Poverty Line (yuan/month)

Calculate the high poverty line. The high poverty line is based on the average consumption level of the society to determine the relationship between food expenditure and total consumption of the lowest income group<sup>[3]</sup>. The specific formula is:

$$\ln P = a + bX \tag{3}$$

P is the per capita consumption expenditure and X is the per capita food expenditure. Establish a linear regression model and calculate a, b. Five years of data were obtained by consulting the Liaoning Province Statistical Yearbook:

years	Per capita consumption expenditure (yuan/month)	Per capita food expenditure (yuan/month)
2012	1003.4	316.5
2013	1101.7	343.9
2014	1207.6	374.5
2015	1309.4	401.2
2016	1425.9	429.3

**Table 1.5** Per capita consumption in 2012-2016

Perform regression analysis on the above data to get the model:

$$\ln P = 5.93529 + 0.003X \tag{4}$$

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.935	.016		370.604	.000
	x	.003	.000	1.000	72.540	.000

a. Dependent Variable: lnP

**Table 1.6** Results of regression analysis

The model's Sig is equal to 5.737364286159496E-6, Sig is small, and has high credibility. It can be used as a model for calculating high poverty lines. The food consumption expenditure of low-income people is taken as the X substitution formula (3), and the corresponding P is calculated by calculation, which is the local high poverty line.

years	Food consumption expenditure of low-income people (yuan/month)	High poverty line (yuan/month)
2012	329.13	1015.04
2013	293.25	911.45
2014	277.67	869.83
2015	280.52	877.30
2016	343.26	1058.99

**Table 1.7** 2012-2016 High Poverty Line (yuan/month)

### 1.3.3 Model solving

years	Minimum amount (yuan/month)	Low poverty line (yuan/month)	High poverty line (yuan/month)
2012	370	493.70	1015.04
2013	412	439.88	911.45
2014	456	416.51	869.83
2015	492	420.78	877.30
2016	517	514.89	1058.99

**Table 1.8** 2012-2016 Liaoning Province Urban Minimum Living Standards

The values of the low poverty line and the high poverty line are calculated by establishing a model, and these values are compared with the minimum living allowance amount in Liaoning Province. The low poverty line is the sum of the minimum food expenditure and non-food expenditure of low-income families, so to some extent it can be said that the low poverty line is the minimum standard that the minimum living allowance should reach. By observing the data for five years, it can be seen that with the economic development of Liaoning Province, the amount of subsistence allowances has increased year by year, which is already higher than the low poverty line, which can meet the basic food and clothing problems of low-income people. It can be seen from the observation of the low poverty line that the average expenditure of low-income people is relatively stable. Although some social and economic environments were received around 2014, spending fell, but overall there was little change. The amount of subsistence allowances is increasing year by year. In the absence of major economic changes, the problem of food and clothing for low-income people can be basically met.

The high poverty line measures poverty levels in terms of average social consumption levels. Using the regression analysis of per capita expenditure in Liaoning Province, the coefficient of the equation is obtained, and the expenditures brought into the low-income group are obtained to meet the normal low-income population. Analysis of data on the high poverty line is highly volatile, especially around 2014. This shows that the high poverty line is affected by the social-economic environment. Compared with the low poverty line, the value of the high poverty line is almost twice that of the former. Low-income people who want to live a normal life still need a lot of economic resources.

### 1.3.4 Factor Analysis

In order to facilitate the analysis of the correlation between the subsistence standards in various regions, and also to improve the accuracy and reliability of the analysis conclusions, the urban and rural minimum living standards of all provinces, municipalities and autonomous regions in 2016 are adopted (yuan/person, Month), the number of unemployed (10,000 people), per capita food expenditure (100 million yuan), per capita disposable income (yuan), household consumption level (yuan) and per capita consumption expenditure

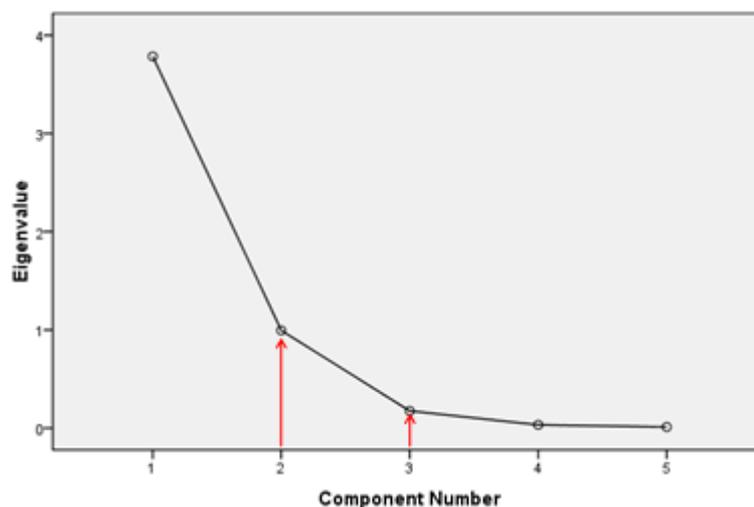
(yuan).The data source is “2017 Liaoning Province Statistical Yearbook”.

When the number of variables to be analyzed is large, it will increase the difficulty and complexity of the analysis problem; and in many practical problems, there is a certain correlation between multiple variables, and then the factor analysis method can be used. Factor analysis is a statistical analysis method that divides multiple variables into a few comprehensive indicators. That is, on the basis of the correlation analysis, replace the old ones with fewer new variables to achieve the effect of dimensionality reduction, and make these fewer new variables retain as much information as possible reflected by the original variables. They are independent of each other.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.836
Bartlett's Test of Sphericity	Approx. Chi-Square	228.066
	df	10
	Sig.	.000

**Table 1.9** KMO values and Bartlett spherical test results

The KMO value is used to test whether the partial correlation coefficient between variables is too small. In general, factor analysis is suitable when the KMO value is high (greater than 0.5). The Bartlett sphere test is used to check whether the correlation coefficient matrix is a unit matrix. If the conclusion does not reject the hypothesis, it means that each variable is independent. From the results obtained in the above table, the KMO test result is 0.836 close to 0.9, which is very suitable for factor analysis. The Sig value of the Bartlett spherical test is 0.000 (less than 0.05), indicating rejection of the hypothesis<sup>[4]</sup>.



**Figure 1.1** Scree plot diagram of factor analysis

It can be seen from Fig. 1.1 that the broken line segments show significant fluctuations when the abscissa is 2 and 3, so the five variables are divided into two major factors for analysis.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.785	75.705	75.705	3.785	75.705	75.705
2	.995	19.905	95.610	.995	19.905	95.610
3	.175	3.499	99.108			
4	.033	.662	99.771			
5	.011	.229	100.000			

Extraction Method: Principal Component Analysis.

**Table 1.10** Characteristic values of each factor and principal component contribution rate

Factor analysis result	Eigenvalues	Contribution rate	Cumulative contribution rate
Factor 1	3.785	75.705	75.705
Factor 2	0.995	19.905	95.610
Description	The cumulative contribution rate of factor 1 and factor 2 has reached 95.610% (more than 85%). Therefore, only factor 1 and factor 2 are required.		

**Table 1.11** Factor Analysis Results

	Component	
	1	2
Per capita consumption expenditure (yuan)	.991	
Per capita disposable income (yuan)	.985	
Household consumption level (yuan)	.979	
Per capita food expenditure (100 million yuan)	.931	
Unemployed (10,000 people)		.997

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

**Table 1.12** Main component load

The first factor has a strong positive correlation with per capita consumption expenditure, per capita disposable income, household consumption level and per capita food expenditure. These variables comprehensively reflect the consumption situation, so the first factor can be considered as the consumption situation. Similarly, the second factor can be considered as a representative of unemployment.

### 1.3.5 Cluster Analysis

The scores obtained from the factor analysis were systematically clustered and classified into two categories according to the results of the factor analysis<sup>[5]</sup>. According to the classification number of cluster analysis, each province and municipality is divided into two categories. The classification results are shown in Table 1.13 and Table 1.14.

area	Classification number	area	Classification number
Beijing	1	Guizhou Province	2
Shanghai	1	Yunnan Province	2
Jiangsu Province	1	Tibet Autonomous Region	2
Tianjin	1	Shanxi Province	2
Zhejiang Province	1	Gansu province	2
Guangdong Province	1	Qinghai Province	2
Fujian Province	1	Ningxia Hui Autonomous Region	2
Chongqing City	2	Xinjiang Uygur Autonomous Region	2
Shanxi Province	2	Liaoning Province	2
Hebei Province	2	Jilin Province	2
Inner Mongolia Autonomous Region	2	Heilongjiang Province	2
Hubei Province	2	Anhui Province	2
Hu'nan Province	2	Jiangxi Province	2
Guangxi Zhuang Autonomous Region	2	Shandong Province	2
Hainan Province	2	He'nan Province	2
Sichuan Province	2		

**Table 1.13** Results of Urban Cluster Analysis

According to the results of cluster analysis, the five urban low-income standard indicators divide each province, municipality and autonomous region into two categories. The first category is the more developed urban areas represented by Beijing, Shanghai, Jiangsu, Tianjin, Zhejiang, Guangdong and Fujian provinces, namely the first-tier cities. The second category is the relatively developed and underdeveloped regions with Liaoning, Hubei, Anhui, and Hainan provinces.

area	Classification number	area	Classification number
Beijing	1	Yunnan Province	2
Shanghai	1	Tibet Autonomous Region	2
Jiangsu Province	1	Shaanxi Province	2
Tianjin	1	Gansu province	2
Zhejiang Province	1	Qinghai Province	2
Guangdong Province	1	Ningxia Hui Autonomous Region	2
Chongqing City	2	Xinjiang Uygur Autonomous Region	2
Shanxi Province	2	Liaoning Province	2
Hebei Province	2	Jilin Province	2
Inner Mongolia Autonomous Region	2	Heilongjiang Province	2
Hubei Province	2	Anhui Province	2
Hu'nan Province	2	Fujian Province	2
Guangxi Zhuang Autonomous Region	2	Jiangxi Province	2
Hainan	2	Shandong Province	2
Sichuan Province	2	He'nan Province	2
Guizhou Province	2		

**Table 1.14** Rural Cluster Analysis Results

It is not difficult to see from the cluster analysis results that the five rural minimum living standard indicators divide the provinces, municipalities and autonomous regions into two categories. The first category is Beijing, Shanghai, Jiangsu, Tianjin, Zhejiang, and Guangdong, which are first-tier cities. The second category is Chongqing, Shanxi, Hebei, Inner Mongolia Autonomous Region, Hubei Province, Hu'nan Province, Guangxi Zhuang Autonomous Region, Hainan Province, Sichuan Province, Guizhou Province and other regions.

According to the results of factor analysis and cluster analysis, in the developed regions, the consumption levels in Beijing and Shanghai are much higher than in other regions, and it is obvious that the unemployment rate in Beijing is low; the consumption level in Fujian Province is relatively low. In other developed regions, the urban minimum living allowance has reached the level of first-tier cities, and the rural minimum living allowance has not yet reached the level of the developed areas in the same area as the north.

## II. Results and discussion

Changes in the amount of subsistence allowances in first-tier cities are greatly affected by consumption, and other urban areas are affected by unemployment. Under normal circumstances, the unemployment rate in the developed regions is at a medium level, the unemployment rate is higher in the more developed regions, and the unemployment rate is lower in the less developed regions, and can be further explained from the perspective of geography.

For the coastal areas, the areas with higher minimum living allowances are concentrated in the north; for other more developed and underdeveloped areas, the places with higher urban minimum living allowances are in the west, and those with higher rural minimum living allowances are in the southwest. The location theory emphasizes the interaction between the various geographical elements of nature and the economic activities of human beings in the spatial position, and believes that the location is the specific expression of the spatial combination of natural geographical location and economic geographic location<sup>[6]</sup>. Therefore, the economic development of the northern, central and southern parts of China has a great impact on people's consumption and employment activities.

As a capital city and a transportation hub city, Beijing's position is very important. The level of urban economic development is very high, and the amount of subsistence allowance for urban population is high. On the other hand, because Beijing's urbanization process is better, it can be drawn. The number of people living in rural areas and unemployed population is very small, and the number of rural households requiring low-income subsidies is small. Therefore, there will be a phenomenon in which the areas with low minimum living allowances in developed areas are concentrated near Beijing.

The southern part of China is located in the south of the Qinling-Huaihe River, east of the Qinghai-Tibet Plateau, and southeast of the sea. It is the southern part of China's monsoon climate zone. The superior natural conditions in the South have also created an irreparable gap between the rich and the poor. Therefore, compared with other parts of China, the rural subsistence allowances in the South are higher, while the urban subsistence allowances are normal. This phenomenon is also closely related to the economic situation of the people. The southwestern part of China has the Qingzang Plateau and other landforms. It has a high terrain and is inland. It is a typical temperate continental climate. There is not much precipitation in normal times, and there is a big gap between cities in other parts of China. Therefore, due to relevant policy decisions, the amount of urban minimum living security in southwestern China is relatively high.

### **III. Conclusion**

The amount of subsistence allowances in various parts of China is highly correlated with geographical conditions and economic conditions. When analyzing and predicting the amount of subsistence allowances, it is necessary to consider geographical and economic factors as indicators for judging the minimum subsistence amount. Different geographical locations, different economic conditions, and the amount of subsistence allowances will vary greatly. Therefore, if you want to calculate the minimum guarantee amount, you should consider establishing a model of each factor and the minimum guarantee amount, and comprehensive analysis to get the correct conclusion.

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