

# Study of Poverty Alleviation Effects for Chinese Fourteen Contiguous Destitute Areas Based on Entropy Method

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## Abstract

China has begun to implement a new round of poverty alleviation and development since 2011, according to the regional distribution, the poverty counties were divided into fourteen destitute areas as the main battlefield in next ten years for China's poverty alleviation. In order to understand the poverty alleviation effects more objectively, this paper uses entropy method to evaluate fourteen contiguous destitute areas in China in 2012, and makes correlation analysis with two reference groups which is one of the Characteristic of this paper. The results show that, poverty alleviation effects of fourteen contiguous destitute areas in 2012 is generally poor, because the mean values of five different correlation degrees in table 3 are lower than 50%, that means the difference between the evaluation value for each area with the minimum reference group does not reach half of the difference between the maximum and minimum reference groups. LiuPan Mountain Area's performance is the best, the lowest is Wumeng Mountain Area. It is surprising that the performance of Wuling Mountain Area, which is pioneer of regional development and poverty alleviation confirmed by State Council of China, is poor. The comprehensive evaluation value of Wuling Mountain Area is only above the value of Tibet Area and Wumeng Mountain Area. In addition, from the comparison of four first-level indexes, the index of production and life makes the best contribution for comprehensive poverty alleviation effects, followed by index of social development and economic development, and the index of works progress of poverty alleviation is ranked last.

**Keywords:** depressed areas, poverty alleviation, regional development

## 1. Introduction

Since 2011 the Chinese government has officially launched the plan of Regional Development and Poverty Alleviation Pilot of Wuling Mountain Area, after then the "China Rural Poverty Alleviation and Development Program (2011-2020)" was published and implemented, until now, China's new round of poverty alleviation and development work has been carried out more than three years. Theoretical and empirical research on poverty alleviation and development is also deepening, the study of contiguous destitute areas also made a series of achievements which mainly focus on poverty measures of China destitute areas, factors and countermeasures which lead to the poverty, regional development strategy, area development and governance, poverty reduction performance, various forms of poverty and so on.

In order to reflect the poverty alleviation effects of Chinese contiguous destitute areas more objectively and to provide a reference for the future development of pro-poor policy formulation and implementation of poverty alleviation projects, on the basis of entropy method, this paper makes an evaluation and sort of the poverty alleviation effects of China's fourteen contiguous destitute areas in 2012. Based on the existing data, the paper sets two reference groups to make a correlation analysis with the Chinese fourteen contiguous destitute areas about the evaluation value of poverty alleviation effects. Then this paper makes analysis for the progress of poverty alleviation and development of each contiguous destitute area.

The rest of this paper is organized as follows. The second part is to build literature review and the evaluation index system of poverty alleviation effects, and the third part is the description of the data sources, the fourth part of this paper is introduction of entropy method. The fifth part is a further analysis for the result of the poverty alleviation effects of fourteen contiguous destitute areas in China. Part six is the section of the conclusions and recommendations

## 2. Literature Review and Evaluation Index System

The evaluation index system of poverty alleviation effects is built on the basis of the understanding of poverty alleviation and the knowledge of poverty. When making the poverty judgment, generally annual net income per capita is the standards, for instance, the current poverty standard of China is annual net income per capita of less than 2300 yuan RMB (with 2010 as the base period). There is also an international poverty line, which is less than one dollar a day (United Nations Millennium Summit, 2000). The advantage of this type of standard is simple to be quantified and strong operability, but the disadvantage is also obvious that a single standard set ignores other aspects in addition to income inequality and poverty, such as education, health, quality of life, etc. The understanding bias of poverty may lead to unsuitable poverty alleviation projects, development plans and other negative results such as “pollution first, treatment later”, strong vulnerability of poverty and other issues.

With the in-depth study of the poverty problem and the further profound understanding of poverty, United Nations Development Programme (UNDP) proposed the concept of “human poverty” in 1997, which is defined as a lack of basic individual right to development and the choice right including income poverty, the poverty of rights, human poverty and poor knowledge (UNDP, 1997). Sen firstly proposed the theory of multidimensional development in 1999, he regards development as the process of expanding peoples real freedom, the real freedom means people’s basic capabilities that people are freed from hunger, malnutrition, preventable diseases and premature death (Sen, 1999). Alkire and Foster proposed the method of identifying, aggregating and decomposing the multidimensional poverty in 2008, this method of measurement uses a more accurate and detailed index system for poverty judgment (Alkire & Foster, 2011). Based on the method of Alkire and Foster, some Chinese scholars measured the multidimensional poverty for the cities and counties in China, and pointed out that besides income poverty, there are other kinds of poverty existed in both urban and rural areas in China (Wang & Wang, 2013).

In order to reflect the poverty alleviation effects of Chinese contiguous destitute areas more comprehensively, according to the multidimensional indicators used to monitor the works progress of poverty alleviation of poor counties by Chinese State Leading Group Office of Poverty Alleviation and Development(CPAD), and use the ideas and methods of United Nations Human Development Index (HDI), OECD green growth measure index system, Chinese green development index (HGDI) (Li, Liu, & Song, 2014), Oxford Poverty and Human Development Initiative’s (OPHI, Oxford) multidimensional poverty Index (Alkire & Foster, 2011), we build an evaluation index system to reflect the effects and progress of poverty alleviation and development of fourteen contiguous destitute areas (see Table 1). Evaluation Index system including four first-level indexes which are economic development, social development, production and life, works progress of poverty alleviation. These four levels include aspects of secondary indicators such as income levels, education and information, medical and health, ecology and environment and so on. We increase ecological indicators and monitor indicators of poverty alleviation works based on the multidimensional poverty index OPHI. In order to promote ecology and environment protection at the same time with poverty alleviation and development process on the one hand, and aims to accelerate the speed of poverty alleviation and development of China on the other hand. The evaluation index system consists of a total of 62 detailed indicators which are objective and quantifiable indicators.

Table 1. Evaluation index system of poverty alleviation effects for contiguous destitute areas

First-level index	Second-level index	Third-level index
Economic Development	Macroeconomics	GDP per capita (million); Fiscal budget and expenditure per capita (million); The balance of the savings deposits of urban and rural residents per capita (million); Investment per capita in fixed assets completed (million)
	Income	Per capita net income of farmers (yuan); Per capita disposable income of urban residents (yuan)
	Poverty Reduction	Poverty rate
Social Development	Education	Percentage of number of administrative villages which have kindergarten or preschool (%); Gross enrollment rate of pre-school education (%); Gross enrollment rate of high school education (%)
	Healthcare	The number of beds per capita health institutions (bed / person); The number of beds per capita social welfare (bed / person); Percentage of number of administrative villages which have fitness equipment (%); Percentage of number of administrative villages which have cultural / sporting events plaza (%); Percentage of the number of administrative villages in which there are clinics (%)

	Social Security	Percentage of the number who participate in the new rural cooperative medical insurance (%); The proportion of the number of participating in the new rural social pension insurance (%)
	Environmental Health	Percentage of the number of administrative villages in which there are garbage dump sites (%); Percentage of the number of administrative villages in which there are landfill sites (%); Percentage of the number of administrative villages in which there are full-time cleaners (%)
	Public Security	Percentage of the number of administrative villages in which there is police station (%); Percentage of the number of administrative villages in which there is community police (%)
	Create Income	Percentage of the number of administrative villages in which there are operating farmhouse (%); Percentage of the number of administrative villages which have agricultural greenhouse facilities (%); Percentage of the number of administrative villages which have facilities of livestock sheds (%); Percentage of the number of administrative villages which have farmers' specialized cooperative economical organization (%); Percentage of the number of administrative villages in which there is organization of poor villages mutual funds (%)
Production and Life	Traffic	Percentage of natural villages' number which have cement / asphalt roads connection (%); Percentage of villages' number which through passenger bus (%)
	Drinking Water Safety	Percentage of natural villages' number which have through running water (%)
	Energy	Natural village percentage of being electrified (%)
	Information	Proportion of the number of natural village through radio and television (%); Proportion of the number of natural village through broadband network (%)
	Service	Proportion of the number of administrative villages which have accounted for more than one community service center (%); Proportion of the number of natural village which have accounted for more than one farmer supermarket (%)
	Ecological Environment	The forest coverage rate (%)
	Farmland	Increased basic farmland / administrative village (mu / village); New basic farmland that is irrigated / administrative village (mu / village); New efficient water-saving agricultural area / administrative village (mu / village)
	Meadow	The new artificial improved pasture and forage area / administrative village (mu / village)
	Ecological Restoration	The new conversion of cropland to forest area / administrative village (mu / village); New cropland to grassland area / administrative village (mu / village)
	Traffic	Mileage of new and expansion (cement / asphalt) rural highway / Number of administrative villages (km / village); Mileage of new built (cement / asphalt) roads inside village / Number of administrative villages (m / village); New (cement / asphalt) road between households / Number of administrative villages (m / village)
Works Progress of Poverty Alleviation	Irrigation	Mileage of new (stone / cement) water channel / Number of administrative villages (m / village); New water infrastructure / Number of administrative villages ( item / village)
	Drinking	Length of new drinking water pipeline / Number of administrative villages (m / village); Number of people whose problem of drinking water has been solved / Number of administrative villages(people / village)
	Energy	Number of new biogas digesters / Number of administrative villages (item / village)
	Economic development	New economic crop area / Number of administrative villages (mu / village); New economic forest area / Number of administrative villages (mu / village); Households percentage which get financial support from government to build new (greenhouse) facilities (%);Households percentage which get financial support from government to build new farm of livestock industry (%); Number of farmers' poultry (cattle / sheep / pig) which support by government / Peasant household (head / household); Number of farmers' poultry (chicken / duck / goose) which support by government / Peasant household (head / household); Number of households that operate farm stay / Peasant household(%)

Living	Households percentage of Poverty alleviation migration (%); Households percentage to complete the reconstruction of dangerous house for difficult family (%); Households percentage which get financial support from government to complete old housing renovation (%)
Training	Sum of frequency that rural people participate in various skills training / Number of rural people (frequency / individual)

### 3. Data Sources

In this paper, raw data used to calculate 62 detailed indicators are CPAD's monitoring data of counties located in fourteen contiguous destitute areas. The original data includes counties' data of fourteen contiguous destitute areas in China, 2012, in addition, in the Four Tibetan-inhabited Areas which include 77 poor counties, 3 counties' data are not included. In the Tibet Area which includes 74 counties, there are only 63 poor counties' data were got. Therefore, the range of evaluation in this paper includes 665 poverty-stricken counties located in fourteen contiguous destitute areas in China, 2012.

### 4. Evaluation Method Based on Entropy Method

The entropy is a measure of uncertainty, the greater the amount of information, the smaller the uncertainty, the smaller entropy; the less amount of information, the greater the uncertainty, the greater the entropy (Agmon, Alhassid & Levine, 1979). Therefore, in a comprehensive evaluation, according to the characteristics of entropy, we can calculate entropy to determine the dispersion degree of an indicator, the greater the dispersion degree of indicator, the greater of the indicator's impact on the final comprehensive evaluation. In addition, the biggest advantages of the entropy is that it is an objective weighting method, each detailed indicator's weight can be calculated based on the indicator's sample observations value.

#### 4.1 Calculation of Entropy

Based on original monitor data, the values of 62 third-level indexes for fourteen contiguous destitute areas are calculated to form a  $14 \times 62$  row-column matrix, denoted by X, then:

$$X = \begin{pmatrix} x_{11} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots \\ x_{m1} & \cdots & x_{mn} \end{pmatrix} = (x_{ij})_{m \times n}, \text{ Where } i = 1, 2 \dots m; j = 1, 2 \dots n; m = 14, n = 62.$$

##### 4.1.1 Data Standardization and Date Translation

In order to eliminate the different influence of positive and negative indicators, matrix X need to be normalized (An, 2014). For the efficiency indicator which is better when the value is greater, namely standardize formula for positive indicators is:  $r_{ij} = \frac{x_{ij} - \min_i(x_{ij})}{\max_i(x_{ij}) - \min_i(x_{ij})}$ , Where  $i = 1, 2 \dots m; j = 1, 2 \dots n$ ;  $\max_i(x_{ij})$  and  $\min_i(x_{ij})$

denote the maximum and minimum values of the j-th indicator in fourteen contiguous destitute areas.

For the cost indicators which is better when the value is smaller, the negative indicators standardized formula is:

$$r_{ij} = \frac{\max_i(x_{ij}) - x_{ij}}{\max_i(x_{ij}) - \min_i(x_{ij})}, \text{ where } i=1, 2 \dots m; j = 1, 2 \dots n; \max_i(x_{ij}) \text{ and } \min_i(x_{ij}) \text{ denote the maximum and}$$

minimum values of the j-th indicator in fourteen contiguous destitute areas.

In addition, since in the process of entropy calculation, there is logarithmic calculation included, in order to eliminate negative impacts, the indicators' normalized value needs to be translated. General method is that the normalized indicators' value plus one after that is used.

##### 4.1.2 Calculation of the Entropy Value of j-th Indicator

To calculate the entropy value of j-th indicator, we must first calculate the indicator value's ratio of i-th area, on the j-th indicator, which is calculated as:  $p_{ij} = s_{ij} / \sum_{i=1}^m s_{ij}$ , there  $0 \leq p_{ij} \leq 1$ ,  $\sum_{i=1}^m p_{ij} = 1$ . Resulting in a new normalized matrix P, expressed as:

$$P = \begin{pmatrix} p_{11} & \cdots & p_{1n} \\ \vdots & \ddots & \vdots \\ p_{m1} & \cdots & p_{mn} \end{pmatrix} = (p_{ij})_{m \times n}, i=1,2,\dots,m; j=1,2,\dots,n; m=14, n=62.$$

Then we can calculate the j-th indicator's entropy value based on matrix P as:  $e_j = -k \sum_{i=1}^m p_{ij} \ln p_{ij}$ ,  $k > 0$ , where  $\ln p_{ij}$  expresses to calculate natural logarithm of  $p_{ij}$ ,  $e_j \geq 0$ .

If  $p_{ij} = 1/m$ , That means on the j-th indicator, the indicator values of fourteen contiguous destitute areas are equal,  $e_j$  get the maximum value, general set  $k = 1 / \ln(m)$ ,  $0 \leq e_j \leq 1$ .

4.1.3 Calculation of the Entropy Weight of the j-th Indicator

Firstly, according to the entropy value of j-th indicator, calculating the variation coefficients of j-th indicator by the formula  $d_j = 1 - e_j$ . Then calculating j-th indicator's weight by normalized the matrix  $D = (d_j)_{1 \times n}$  ( $j = 1, 2 \dots$

n), the formula is  $w_j = d_j / \sum_{j=1}^n d_j$ , where  $0 \leq w_j \leq 1$ ,  $\sum_{j=1}^n w_j = 1$ .

4.2 Comprehensive Evaluation Value of the Poverty Alleviation Effects and Calculation of the Evaluation Value of Four First-Level Indexes

4.2.1 Comprehensive Evaluation Value of the Poverty Alleviation Effects

Base on entropy weight of every indicator and matrix P, we can calculate comprehensive evaluation value of the poverty alleviation effects for fourteen contiguous destitute areas. The formula is  $f_i = \sum_{j=1}^n w_j \times p_{ij}$ , where  $i = 1, 2 \dots m; j = 1, 2 \dots n; m = 14, n = 62$ . The larger  $f_i$  in an area, indicating the more significant effects of the area about poverty alleviation, by comparing the values of  $f_i$  between different areas, poverty alleviation effects can be sorted between areas.

4.2.2 Calculation of the Evaluation Value of Four First-Level Indexes

According to the additivity of entropy weight (An, 2014), the evaluation values of four first-level indexes for fourteen contiguous destitute areas can be calculated. This paper makes a weighted sum of the evaluation value of third-level indexes to get the evaluation values of four corresponding first-level indexes which are economic development, social development, production and life, works progress of poverty alleviation for fourteen contiguous destitute areas as  $f_i^k$  respectively (where  $i=1, 2 \dots m; k=1, 2, 3, 4$ ).

5. Evaluation Result and Analysis of Poverty Alleviation Effects for Fourteen Contiguous Destitute Areas

5.1 Evaluation Value and Analysis of Poverty Alleviation Effects

According to the evaluation method based on entropy method above, this paper measures comprehensive evaluation values of poverty alleviation effects and the evaluation values of four first-level indexes respectively for fourteen contiguous destitute areas (data including 665 poor counties in fourteen contiguous destitute areas) in China, the results are showed in Table 2 .

Table 2. Evaluation values of poverty alleviation effects for fourteen contiguous destitute areas and two reference groups, 2012

Areas and Reference groups	Comprehensive Evaluation Value ( $f_i$ )	Economic Development ( $f_i^1$ )	Social Development ( $f_i^2$ )	Production and Life ( $f_i^3$ )	Works Progress of Poverty Alleviation ( $f_i^4$ )
Liupan Mountain Area	0.076364	0.006552	0.016804	0.017435	0.035574
Daxinganling South Area	0.076210	0.006792	0.015111	0.018682	0.035624
Qinba Mountain Area	0.075442	0.007536	0.018058	0.016462	0.033386
Yanshan-Taihang Mountain Area	0.073237	0.008510	0.017267	0.016967	0.030493
Western Yunnan Area	0.072663	0.007039	0.016138	0.014698	0.034788
South Xinjiang Area	0.072106	0.006133	0.016958	0.016863	0.032152
Luoxiao Mountain Area	0.071620	0.006790	0.019293	0.015230	0.030307
Four Tibetan-inhabited Areas	0.071029	0.008436	0.014089	0.013633	0.034870

Lvliang Mountain Area	0.070819	0.006787	0.016950	0.017140	0.029943
Dabie Mountain Area	0.070119	0.007112	0.017214	0.016931	0.028862
Desertification Area of Yunnan, Guangxi and Guizhou	0.069568	0.006424	0.014642	0.013677	0.034826
Wuling Mountain Area	0.067828	0.007087	0.015216	0.014326	0.031198
Tibet Area	0.066929	0.007169	0.016203	0.012078	0.031479
Wumeng Mountain Area	0.066066	0.006541	0.013895	0.012911	0.032719
Maximum Reference Group	0.106838	0.010487	0.023316	0.021722	0.051314
Minimum Reference Group	0.053419	0.005244	0.011658	0.010861	0.025657

Note. Calculate to 6 decimal places.

In order to reflect the poverty alleviation effects better, it is necessary to set two reference groups which are standers to judge the results of fourteen contiguous destitute areas. There are two different ideas to set reference groups, the first one is based on the targets of national poverty alleviation planning to set each index in the index system; the second one is based on the evaluation values of poverty alleviation effects for fourteen contiguous destitute areas.

This paper chooses the second way to set reference groups. Firstly, choosing the maximum value and the minimum value for every index from matrix P in order to form maximum reference group and minimum reference group. The maximum reference group  $Q_{\max} = (q_j)_{1 \times n} = \max_i p_{ij}$ , where  $i = 1, 2, \dots, M$ ;  $j = 1, 2, \dots, N$ ; and

$\max_i p_{ij}$  indicates on the j-th index, taking the maximum value from the fourteen contiguous destitute areas

$p_{ij}$ . The minimum reference group  $Q_{\min} = (q_j)_{1 \times n} = \min_i p_{ij}$ , where  $i = 1, 2, \dots, M$ ;  $j = 1, 2, \dots, N$ ; and  $\min_i p_{ij}$

indicates on the j-th index, taking the minimum value from the fourteen contiguous destitute areas  $p_{ij}$ . The second idea of setting reference groups is equivalent to combine the maximum and the minimum values on each indicator for all fourteen contiguous destitute areas in 2012 into two imaginary new areas, representing the best and the worst scores of the fourteen contiguous destitute areas on each indicator in 2012. If applying the factor of time into analysis, the standard will be changing over time, and the standard of maximum reference group will increase until it reaches the goals of national poverty alleviation and development planning.

Secondly, by making the weighted sum of the index values of the maximum and the minimum reference groups respectively based on the index's weight of entropy  $w_j$ , we can measure out comprehensive evaluation values  $f_{\max}$  and  $f_{\min}$  of the poverty alleviation effects of the maximum and the minimum reference groups, and the evaluation values of four first-level indexes (Represented by  $f_{\max}^k$  and  $f_{\min}^k$  respectively, where  $k = 1, 2, 3, 4$ ), calculation results are shown in the last two rows in Table 2.

Thirdly, estimating the correlation degree of the evaluation values which include comprehensive evaluation values and evaluation values of four first-level indexes of fourteen contiguous destitute areas with which of two reference groups. The correlation degree of comprehensive evaluation value of poverty alleviation effects

between each area with two reference groups can be calculated as:  $g_i = \frac{f_i - f_{\min}}{f_{\max} - f_{\min}} \times 100\%$ , where  $i=1, 2, \dots, m$ .

The correlation degree of evaluation values of four first-level indexes between each area with two reference

groups can be calculated as:  $g_i^k = \frac{f_i^k - f_{\min}^k}{f_{\max}^k - f_{\min}^k} \times 100\%$ , where  $i=1, 2, \dots, m$ ;  $k=1, 2, 3, 4$ . Final results are shown in

Table 3.

Table 3. Correlation degree between poverty alleviation effects of fourteen contiguous destitute areas with two reference groups in 2012

Areas	Comprehensive Evaluation Value ( $g_i$ )	Economic Development ( $g_i^1$ )	Social Development ( $g_i^2$ )	Production and Life ( $g_i^3$ )	Works Progress of Poverty Alleviation ( $g_i^4$ )
Liupan Mountain Area	42.95%	24.94%	44.14%	60.53%	38.65%
Daxinganling South Area	42.66%	29.53%	29.62%	72.01%	38.85%
Qinba Mountain Area	41.23%	43.71%	54.90%	51.57%	30.13%
Yanshan-Taihang Mountain Area	37.10%	62.29%	48.12%	56.22%	18.85%

Western Yunnan Area	36.02%	34.24%	38.43%	35.33%	35.59%
South Xinjiang Area	34.98%	16.97%	45.46%	55.26%	25.31%
Luoxiao Mountain Area	34.07%	29.49%	65.49%	40.23%	18.12%
Four Tibetan-inhabited Areas	32.96%	60.88%	20.86%	25.53%	35.91%
Lvliang Mountain Area	32.57%	29.43%	45.40%	57.81%	16.70%
Dabie Mountain Area	31.26%	35.63%	47.66%	55.89%	12.49%
Desertification Area of Yunnan, Guangxi and Guizhou	30.23%	22.51%	25.60%	25.93%	35.74%
Wuling Mountain Area	26.97%	35.15%	30.53%	31.91%	21.60%
Tibet Area	25.29%	36.71%	38.99%	11.21%	22.69%
Wumeng Mountain Area	23.67%	24.73%	19.19%	18.87%	27.53%

Note. Calculate to 6 decimal places.

By calculating the mean values of five different correlation degrees in table 3, the correlation degree's mean value of comprehensive evaluation value between fourteen contiguous destitute areas with which of two reference groups is 33.71%; the correlation degree's mean values of four first-level indexes between fourteen contiguous destitute areas with which of two reference groups are 34.73%, 39.6%, 42.74%, 27.01% respectively. Therefore, in these four first-level indexes, the best performance is the production and life, followed by social development and economic development, while works progress of poverty alleviation is in the final ranking.

In addition, results in Table 3 show that the effects of poverty alleviation for fourteen contiguous destitute areas are generally poor. On the one hand, the mean values of five different correlation degrees in table 3 are lower than 50%, that means the difference between the evaluation value for each area with the minimum reference group does not reach half of the difference between the maximum and minimum reference groups; on the other hand, the result of comprehensive evaluation value  $g_i$  indicates the values of fourteen contiguous destitute areas are all less than 50%, the highest is Liupan Mountain area which reaches only 42.95%; the results of economic development  $g_i^1$  which is one of the four first-level indexes indicate only Yanshan-Taihang Mountain Area and Four Tibetan Area are respectively 62.29% and 60.88%, and the remaining areas are less than 50%; the results of first-level index social development  $g_i^2$  indicate only Luoxiao Mountain Area is 65.49%, and the remaining areas are less than 60%; the results of first-level index production and life  $g_i^3$  indicate only Daxinganling South Area and Liupan Mountain Area are 72.01% and 60.53%, and the remaining areas are less than 60%; the results of first-level index Works progress of poverty alleviation  $g_i^4$ , fourteen contiguous destitute areas are all belowing 40%.

### 5.2 Sort and Analysis for the Evaluation Values of Poverty Alleviation Effects of Fourteen Contiguous Destitute Areas

According to results in Table 2, in Table 2, fourteen contiguous destitute areas can be sorted basing on the comprehensive evaluation values and four first-level indexes' evaluation values. Results are shown in Table 4. Base on fourteen contiguous destitute areas' mean values of five different indexes (excluding the two reference groups) in Table 2 or Table 3, we known that the top seven of the fourteen contiguous destitute areas are higher than the mean value in the indexes of comprehensive evaluation value, social development, production and life, and progress in poverty alleviation works, in the index of economic development, the top six of the fourteen contiguous destitute areas are higher than the mean value (see Table 4).

Table 4. Ranking of poverty alleviation effects for fourteen contiguous destitute areas in 2012

Ranking	Comprehensive Evaluation Value	Economic Development	Social Development	Production and Life	Progress in Poverty Alleviation
1	Liupan Mountain Area	Yanshan-Taihang Mountain Area	Luoxiao Mountain Area	Daxinganling South Area	Daxinganling South Area
2	Daxinganling South Area	Four Tibetan-inhabited Areas	Qinba Mountain Area	Liupan Mountain Area	Liupan Mountain Area
3	Qinba Mountain Area	Qinba Mountain Area	Yanshan-Taihang Mountain Area	Lvliang Mountain Area	Four Tibetan-inhabited Areas
4	Yanshan-Taihang	Tibet Area	Dabie Mountain	Yanshan-Taihang	Desertification Area

	Mountain Area		Area	Mountain Area	of Yunnan, Guangxi and Guizhou
5	Western Yunnan Area	Dabie Mountain Area	South Xinjiang Area	Dabie Mountain Area	Western Yunnan Area
6	South Xinjiang Area	Wuling Mountain Area	Lvliang Mountain Area	South Xinjiang Area	Qinba Mountain Area
7	Luoxiao Mountain Area	Western Yunnan Area	Liupan Mountain Area	Qinba Mountain Area	Wumeng Mountain Area
8	Four Tibetan-inhabited Areas	Daxinganling South Area	Tibet Area	Luoxiao Mountain Area	South Xinjiang Area
9	Lvliang Mountain Area	Luoxiao Mountain Area	Western Yunnan Area	Western Yunnan Area	Tibet Area
10	Dabie Mountain Area	Lvliang Mountain Area	Wuling Mountain Area	Wuling Mountain Area	Wuling Mountain Area
11	Desertification Area of Yunnan, Guangxi and Guizhou	Liupan Mountain Area	Daxinganling South Area	Desertification Area of Yunnan, Guangxi and Guizhou	Yanshan-Taihang Mountain Area
12	Wuling Mountain Area	Wumeng Mountain Area	Desertification Area of Yunnan, Guangxi and Guizhou	Four Tibetan-inhabited Areas	Luoxiao Mountain Area
13	Tibet Area	Desertification Area of Yunnan, Guangxi and Guizhou	Four Tibetan-inhabited Areas	Wumeng Mountain Area	Lvliang Mountain Area
14	Wumeng Mountain Area	South Xinjiang Area	Wumeng Mountain Area	Tibet Area	Dabie Mountain Area

We can get the performance of fourteen contiguous destitute areas' in four first-level indexes by the stander of mean value (shown as Table 5).

Table 5. Poverty alleviation effects of four first-level indexes for fourteen contiguous destitute areas in 2012

Areas	Ranking of		
	Comprehensive Evaluation Value	Index higher than mean value	Index lower than mean value
Liupan Mountain Area	1	Social Development, Works Progress in Poverty Alleviation	Economic Development, Production and Life
Daxinganling South Area	2	Production and Life, Works Progress in Poverty Alleviation	Economic Development, Social Development
Qinba Mountain Area	3	Economic Development, Social Development, Production and Life, Works Progress in Poverty Alleviation	-
Yanshan-Taihang Mountain Area	4	Economic Development, Social Development, Production and Life	Works Progress in Poverty Alleviation
Western Yunnan Area	5	Works Progress in Poverty Alleviation	Economic Development, Social Development, Production and Life
South Xinjiang Area	6	Social Development, Production and Life	Economic Development, Works Progress in Poverty Alleviation
Luoxiao Mountain Area	7	Social Development	Economic Development, Production and Life, Works Progress in Poverty Alleviation
Four Tibetan-inhabited Areas	8	Economic Development, Works Progress in Poverty Alleviation	Social Development, Production and Life
Lvliang Mountain Area	9	Social Development, Production and Life	Economic Development, Works Progress in Poverty Alleviation

Dabie Mountain Area	10	Economic Development, Social Development, Production and Life	Works Progress in Poverty Alleviation
Desertification Area of Yunnan, Guangxi and Guizhou	11	Works Progress in Poverty Alleviation	Economic Development, Social Development, Production and Life
Wuling Mountain Area	12	Economic Development	Social Development, Production and Life, Works Progress in Poverty Alleviation
Tibet Area	13	Economic Development	Social Development, Production and Life, Works Progress in Poverty Alleviation
Wumeng Mountain Area	14	Works Progress in Poverty Alleviation	Economic Development, Social Development, Production and Life

Results in Table 5 show that Liupan Mountain Area and Daxinganling South Area of which comprehensive evaluation values are ranked first and second are both performed relatively well in social development, Progress in Poverty Alleviation works, but are less than the mean value in economic development and production and life; Qinba Mountain Area which is ranked third expresses more balanced in the four first-level indexes that all above the mean value; Yanshan-Taihang Mountain Area ranked fourth has three first-level indexes reaching the mean value, it is dragged down mainly by index of works progress of poverty alleviation; in the contrary, Western Yunnan Area ranked fifth is mainly benefit from the index of works progress of poverty alleviation.

## 6. Conclusion and Suggestion

Based on the calculation and analysis of evaluation index system of the poverty alleviation effects, we can conclude that poverty alleviation effects of fourteen contiguous destitute areas in 2012 is generally poor, because the mean values of five different correlation degrees in table 3 are lower than 50%, that means the difference between the evaluation value for each area with the minimum reference group does not reach half of the difference between the maximum and minimum reference groups.

In relative terms, the comprehensive evaluation value of Liupan Mountain Area is highest and ranked first, the comprehensive evaluation value of Wumeng Mountain Area ranked last. And it is surprising that the performance of Wuling Mountain Area which is pioneer of regional development and poverty alleviation confirmed by State Council of China is poor. The comprehensive evaluation value of Wuling Mountain Area is only above the value of Tibet Area and Wumeng Mountain Area, in the four first-level indexes, only index of economic development is higher than the mean value of fourteen contiguous destitute areas, the remaining three were lower than the mean value of the fourteen contiguous destitute areas.

In addition, from the comparison of four first-level indexes, the index of production and life makes the best contribution for comprehensive poverty alleviation effects, followed by the index of social development and economic development, and the index of works progress of poverty alleviation is ranked last.

From the three conclusions, we know that in order to reach the goal of building a well-off society, the most arduous task for Chinese government is how to develop the rural areas, especially the fourteen contiguous destitute areas. It is necessary to enhance the understanding of poverty alleviation work's importance in fourteen contiguous destitute areas and the dimensions of poverty. Poverty is not just income poverty, but a multidimensional phenomenon (Bennett & Mitra, 2013). Poverty alleviation and development cannot be carried out from only a single aspect. It should be carried out from multi aspects, and promotes the balance development of poor areas.

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