ISSN:2790-1661 Volume-6-(2023)

Construction and Empirical Evidence of the Evaluation Index System of "Healthy Living Destination": Taking Yunnan Province as an Example

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Abstract. The evaluation index system of "Healthy Living Destination" was constructed by applying the extreme value entropy weighting method from three dimensions of health environment, social economy and health services and guarantee. Eight cities in Yunnan were evaluated. The results showed that Kunming City ranked first in all dimensions, while Zhaotong City, Lincang City and Lijiang City ranked lowest in the above three dimensions, showing an unbalanced and insufficient state in the province. And countermeasures and suggestions were made based on the results.

Keywords: Healthy living destinations; evaluation index system; extreme value entropy weigh ting method;Yunnan.

1. Introduction

In early 2021, the "Proposal of the CPC Yunnan Provincial Committee on Formulating the 14th Five-Year Plan and 2035 Visionary Goals for National Economic and Social Development in Yunnan Province" clearly stated that "Healthy Living Destination" is the "trump card" of Yunnan's high-quality development [1]. What is the connotation of the concept of "Healthy Living Destination"? How to evaluate whether a city is a healthy living destination?

Foreign studies on "Healthy Living Destination" mainly take health towns and historical towns as research objects to study sustainable development and innovation models of towns and cities [2-4]. Domestic researches on "Healthy Living Destination" are mostly qualitative analysis, mainly focusing on human settlement environment governance [5], medical security [6], healthy lifestyle [7], health industry [8-9] and other aspects. Xing Man Hong uses questionnaire survey to grade the "Healthy Living Destination" in Yunnan Province, but the evaluation is not objective enough [10]. Thus, we use Maslow's hierarchy of needs theory to deeply analyze the connotation of "Healthy Living Destination". Then, the paper constructs the evaluation index system of "Healthy Living Destination" and carry out an empirical analysis. Finally, the paper offers some suggestions.

2. Construction of Evaluation Index System of Healthy Living Destination

2.1 Evaluation Index System

In 1943, Maslow pointed out that the needs involved in human life can be divided into five levels from basic level to advanced level: physiological level, safety level, social level, respect level and self-actualization level [11]. Therefore, the evaluation index system of healthy living destinations should reflect the meaning of physiological safety, social respect and self-realization. Based on "Healthy China 2030" Planning Outline and other information, this paper took the healthy living as the first-level index, and the healthy environment, social economy, health services and guarantee as the second-level indexes. Third-level indexes include 19 subdivided items. They are percentage of days with good air quality, drinking water quality up to standard rate, green coverage of built-up areas, per capita green area of the park, urban sewage centralized treatment rate, harmless disposal rate of household garbage, density of public toilets (seat/km2), per capita GDP (Yuan), urban per capita disposable income, urban per capita residential building area, length of highway open to traffic (km), health index of political-business relations, number of attractions above 3A level

, county numerical index, investment in large health industry (100 million yuan), number of urban basic Medical Insurance Participants (10,000), number of health technicians, number of beds in health institutions, and the number of retirement beds per 1,000 elderly people.

3. Method of Evaluation

According to Zhu Xi 'an's discussion [12], this paper adopted the improved extreme entropy weight method for weight calculation.

3.1 Dimensionless Processing of Original Data

The original values of the third-level indicators should be processed dimensionless before the weights are assigned. Let the original data matrix of the third-level index be: $X=\begin{bmatrix} x_{11} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots \\ x_{m1} & \cdots & x_{mn} \end{bmatrix}$.

Where, m represents the number of evaluation objects, n represents the number of third-level indicators, $n = 1,2,\cdots,19$. x_{mn} represents the nth third-level index value of the mth evaluation object. The indicators screened in this paper are benefit indicators. Therefore, the standardized processing conversion function is as follows: $x_{ij}^{'} = \frac{x_{ij}-x_{jmin}}{x_{jmax}-x_{jmin}}$.

Where, x_{ij} is the number of the jth third-level index of the ith-level evaluation object, $i = 1,2,\cdots,m$, $j = 1,2,\cdots,n$. x_{jmin} is the minimum value of the jth index in all evaluation objects, x_{jmax} is the maximum value of the jth index in all evaluation objects, $x_{ij}^{'}$ is the value of the jth third-level index of the ith evaluation object after standardization by extreme value method.

Since there is logarithmic function operation in the following formula operation, it is necessary to carry out the overall translation of the standardized third-level index value. Meanwhile, the value α of the overall translation range should be as small as possible. The translation length is as follows: $\alpha = 0.0001$[13], namely, $x_{ij}^{''} = x_{ij}^{'} + 0.0001$.

3.2 Determination of Weight and Overall Score

After the above treatment of the third-level index values, the effective standardized values with the same dimension are obtained. Next, the entropy weight method is used to determine the weight of indicators. Firstly, we calculate the index value ratio of the ith evaluation object on the jth third-level evaluation index: $p_{ij} = \frac{x_{ij}^{''}}{\sum_{i}^{m} x_{ij}^{''}}$. Secondly, we calculate the information entropy value of the third-level index of the j item: $e_j = -\frac{1}{\ln m}\sum_{i=1}^{m} p_{ij}\ln(p_{ij})$, where, $0 \le e_j \le 1$. Thirdly, we calculate the difference coefficient of the third-level evaluation index x_j. According to the meaning of e_j, the concept of information entropy redundancy, namely the difference coefficient, $g_j = 1 - e_j$, can be derived. Finally, we set $w_j = \frac{g_j}{\sum_{j=1}^{n} g_j}$ as the final weight coefficient of the jth third-level index, where $j = 1,2,\cdots,n$.

According to the above calculation process, the single score of jth third-level indicator can be obtained as $s_{ij} = w_j x_{ij}^{''}$, and the comprehensive score of the ith evaluation object is $\sum_{j=1}^{n} s_{ij}$.

4. Empirical Analysis

4.1 Evaluation Objects and Data Source

This paper selected 8 major municipal areas in Yunnan Province as the empirical research objects. They are Kunming City, Qujing City, Yuxi City, Baoshan City, Zhaotong City, Lijiang City, Pu 'er City and Lincang City.

All data were collected from Yunnan Statistical Yearbook, Statistical Bulletin of National Economic and Social Development, Yunnan Ecological Environment, Health, Housing and Urban-Rural Construction, Transportation, National Economic Accounting, Human Resources and Social Security, and Civil Affairs Departments in 2019, as well as the National Development and Strategic Research Institute of Renmin University of China, the Resource Development Department of the Ministry of culture and tourism, Center for Tourism Research, Planning and Design of Chinese Academy of Sciences and the Ali Research Institute. This paper adopted the 0 point system, namely, 0 was used to replace the missing part of the original data.

4.2 Results of Evaluation

After sorting out the original relevant data, the empirical analysis was carried out by using the extreme entropy weight method. Scores of healthy living destinations' evaluation and the ranking results of 8 cities are shown in Table 1.

Table 1. Comprehensive Evaluation Scores and Rankings of 8 Cities in Yunnan Province

Rankings	Name	Score of healthy environment	Score of social economy	Score of health services and guarantee	Comprehensive score
1	Kunming City	0.2001	0.2118	0.4349	0.8468
2	Yuxi City	0.1759	0.1647	0.0429	0.3835
3	Qujing City	0.1558	0.1235	0.0931	0.3724
4	Lincang City	0.1783	0.0498	0.0601	0.2883
5	Lijiang City	0.0798	0.1351	0.0055	0.2203
6	Pu 'er City	0.0804	0.1003	0.0365	0.2171
7	Zhaotong City	0.0535	0.0895	0.0716	0.2146
8	Baoshan City	0.0908	0.0644	0.0447	0.1999
	Average score	0.1268	0.1174	0.0601	0.2883

Kunming City respectively achieved the first place in the number of days with good air quality in the field of healthy environment, the green coverage of built-up areas, the harmless disposal rate of household garbage, and the density of public toilets. Meanwhile, Zhaotong City ranked the last in the score of healthy environment. Concerning social economy, Kunming City's economic and social development pace is steady and solid, ranking the first. Lincang City scored the lowest in socioeconomic aspects, indicating that the city needs to make more efforts to improve people's living standards and ensure the steady development of the city's social economy. In terms of health services and guarantee, Kunming City has more high-quality health resource elements, and its overall health services and guarantee level is higher, ranking the first. However, Lijiang City scored the lowest in health services and guarantee.

5. Countermeasures and Suggestions

To build a sustainable "Healthy Living Destination" with Yunnan characteristics, this paper deeply interpreted the connotation of "Healthy Living Destination", and used the method of extreme entropy weight to construct the evaluation index system of "Healthy Living Destination". We found that the development of healthy living destinations in Yunnan Province is unbalanced and insufficient. And the following aspects need to be improved.

First, we should make overall plans and pay attention to the "healthy" and coordinated development of regions. Combining the resource advantages and regional characteristics of different administrative regions, the construction of healthy cities in different regions should be carried out in a holistic way.

Second, we must increase investment in medical and health infrastructure and promote the construction of human settlements. First, the whole province can utilize the Belt and Road Initiative to channel funds into medical and health infrastructure construction and other livelihood projects. Second, the PPP model can inject government funds into the master fund to manage the pension and

healthcare industry, and attract world-class pension and healthcare brands and private capital to invest in the large healthcare industry. Third, relevant departments need to increase health vocational education, and promote the construction of a soft environment for health services and guarantee.

Third, it is suggested to strengthen digital construction, implement data linkage and improve construction efficiency. First, we need to strengthen the digital development of government affairs. In particular, in the municipal areas where the index score is 0, relevant departments should improve their scientific statistical capabilities. Second, we should strengthen data linkage, and let the data assist governments at all levels to coordinate and guide the work of all functional departments, so it can accurate health construction and improve efficiency.

Acknowledgement

The paper is supported by the National Natural Science Foundation of the People's Republic of China (grant U2002201), Yunnan Provincial High-level Talent Training Support Program "Young Top Talents" Special Project (grant YNWR-QNBJ-2020-229), Yunnan Provincial Postgraduate Quality Course Project, Yunnan Provincial Professional Degree Postgraduate Teaching Case Database Construction Project, Scientific Research Fund of Yunnan Provincial Education Department (grant 2023Y0915), and Yunnan Normal University Postgraduate Core Curriculum Construction Project (grant YH2020-C08).

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