

## Performance Evaluation on the Promotion of Rural Health Teaching

### Strategy based on DEA Analysis in China

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#### Abstract

The urbanization development has resulted in young farmers' emigration to big cities, and the left middle aged and elderly farmers generally show declining physical and mental functions and are suffering from chronic diseases. Physical health is the major demands of the middle aged and the elderly. To protect the physical and mental health and enhance the quality of life, the government has positively promotion of rural health teaching strategy to reinforce preventive health care, make screening, and manage and prevent chronic diseases.

In this study, Delphi Method is utilized for drafting the performance evaluation indicators for rural health teaching strategy and Data Envelopment Analysis is applied to evaluate efficiency. Taking Zhejiang Province as the research object, cities in Zhejiang Province are selected total 13 DMUs in this study. The research results show that 1. 1 DMU presents strong rural health teaching strategy efficiency, 5 DMUs reveal the rural health teaching strategy practice efficiency in 0.9 and 1, and 7 DMUs appear the rural health teaching strategy practice efficiency lower than 0.9 and 2. the key factors in rural health teaching strategy are found out through sensitivity analysis to understand the sensitivity to efficiency. Finally, suggestions are proposed according to the results, expecting to help farmers present the knowledge and skill about disease prevention and health enhancement so as to promote self-preventive health care and further enhance health quality.

**Keywords:** farmer, health teaching strategy, performance evaluation

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## Introduction

The urbanization development results in young farmers' emigration to big cities and the rest middle aged and elderly farmers generally present declining physical and mental functions and are suffering from chronic diseases. Physical health is considered as the major demands of the middle aged and the elderly. The government therefore positively conducts illness prevention and health promotion measures, reinforce preventive health care, make screening, and manage and prevent chronic diseases to protect the physical and mental health and promote the quality of life. In addition to the governmental coping measures, the middle aged and the elderly have to start from self-health management to positively protect and enhance the health. The goal of rural health teaching strategy lies in the practice of health behavior. It is critical in teaching strategy to form individual value from the awareness; especially, the value formed by farmer-centered value could really affect the attitudes and behaviors. Rural health teaching strategy should be the process to assist farmers in establishing correct health knowledge and value. Instructors should engage in the teaching with the attitude to improve farmers. As a result, the knowledge and skills of "farmers' health promotion" are urgently demanded. It therefore should draft strategies for learning courses related to rural health teaching strategy, provide learning opportunities for protecting farmers' health, design suitable teaching activity and contents, integrate community life and resources, and adopt coping strategies to have the middle aged and elderly farmers age healthily, successfully, and actively as well as to establish the harmonious society being close to, respecting, and pleasing the elderly. The rural health teaching strategy is evaluated the effectiveness in this study, expecting to help the middle aged and elderly farmers present the knowledge and skills of disease prevention and health enhancement in order to promote self-preventive health care ability and further enhance the health quality.

## Literature Review

### Rural health teaching strategy

Bo et al. (2015) indicated that a person engaging in rural health teaching strategy should present professional training, knowledge, and skills, as rural health teaching strategy was professional. Velasco et al. (2015) pointed out rural health teaching strategy transferring health knowledge, through teaching strategy strategies, into behavior models required for farmers and villages. Wang (2016) regarded rural health teaching strategy as the strategy beneficial to farmers' health; with planned and integrated methods, the participants voluntarily prevented, started, or maintained existing behaviors, rather than simply changing the behaviors. Kendrick et al. (2015) defined rural health teaching strategy as the subject covering definitely constructed learning opportunities, which contained to promote health training beneficial to individual and community health, enhance knowledge, and develop life skills. Von et al. (2015) pointed out rural health teaching strategy as the science and art strategies to enhance people's health competence, cultivate the health attitudes, and develop

the health behavior to further enhance the quality of life. Wang and Wang (2016) proposed the points of rural health teaching strategy as farmers and the behaviors, aiming to encourage farmers practicing healthy lifestyles, smartly applying existing health service, being able to individually or collectively make decisions, and improving personal health state and living environment. Kramlich and Dende (2016) indicated that rural health teaching strategy could design activity and evaluaterural health teaching strategy plans and activities to enhance farmers' health. Wu et al. (2016) regarded rural health teaching strategy as the combination of any planned learning experiences according to actual experiences or sound theories to provide opportunities and keep the knowledge, attitudes, and skills of health behaviors. Clark et al. (2016) mentioned that rural health teaching strategy concerned about farmers' health, enhanced farmers' knowledge, attitudes, and behavior changes through the support of teaching strategy, organization, economy, and environment, and facilitated the voluntary care of personal health. It concerned about the comprehensive physical, mental, spiritual, and social health, stressed on farmers' self-care, self-responsibility, community orientation, and interdisciplinary with holistic, humanistic, and lifelong teaching strategy.

### **Performance evaluation**

Social resources are limited. The optimal utilization of limited resources has been the concern of managers. Efficiency and effectiveness are often used for measuring organizational ability in applying resources and achieving goals as the point in performance evaluation. Fatemeh and Pourmahmoud (2016) regarded efficiency as doing the thing right and emphasizing the use of correct means. It mainly measured the degree of the internal resources of an organization being effectively applied in short period. With the discussion of the relationship between inputs and outputs, it aimed to acquire the most outputs with the least inputs, or find out the method to reduce production costs in order to enhance the use benefit of resources, as well as regard the results as the reference for improving organizational productivity (Cairney & Stewart, 2015). Ohsatoa and Takahashi (2015) defined effectiveness as doing the right thing, indicating that an organization, under the premise of the customers acquiring the maximal value, utilized the ability to generate income with external business; it stressed on the measurement of ends, mainly discussing whether an organization effectively achieved the set goal within a period of time (Bedardb et al., 2015).

Efficiency could be the performance on transferring inputs into outputs, focusing on effectively utilizing preset production resources. In economics, the idea of Pareto Optimality (Zhou & Zhu, 2017) could be used for the further explanation. From the aspect of input orientation, an organization was considered efficient when, with the same outputs, increasing input resources or reducing the yield of several other outputs to increase the yield of the output. From the aspect of output orientation, an organization, with the same inputs, reducing production or increase several other input resources to reduce inputs, was efficient.

## Research indicator and objective

### Establish of research indicator

By summing up above effectiveness evaluation indicators of rural health teaching strategy, Delphi Method is utilized for drafting the indicators. Delphi Method, also named expert judgment, is the group decision-making method with qualitative and quantitative characteristics and is interdisciplinary and future oriented. In the research process with inadequate data or unknown situations of certain issues, the anonymous expert survey with several runs of votes and feedback could reduce the different opinions down to the lowest for a commonly acceptable answer.

The so-called “experts”, according to literature suggestions, should present 1) interests in participating in Delphi Method survey, 2) rich information for sharing, 3) publically approved knowledge and technology in specific field, 4) expertise in the surveyed subject, including practical experience and theoretical research, and 5) agreement with the research results containing the personal special information. Kang et al. (2015) also indicated that an expert should present knowledge standard, reliability, and accuracy as well as show deeper knowledge of the industry than amateurs so that experts’ judgment was closer to the real conditions than it of ordinary people. The value of Delphi Method is established based on such answers.

### Establishment of evaluation indicator

According to Delphi Method to establish evaluation indicators, the variables are defined as following.

(1) Input variable:

1. Financial dimension: including capitals of rural health teaching strategy personnel costs, pension, food expenses, overtime pay, and welfare and benefits.

2. Teaching strategy scale: containing the number of people for farmers’ health teaching strategy.

(2) Output variable:

1. Medical outcome: covering the number of medical utilization and seeking for medical aid.

2. Prevention outcome: activity to prevent from diseases, e.g., total number of people for vaccination and quitting smoking and drinking.

### Research method and object

Aiming at Zhejiang Province as the research object, the cities are selected as the research samples. With “Delphi Method” and “Data Envelopment Analysis”, public statistical yearbooks of the cities are regarded as the performance indicator data of inputs and outputs for analyses. Total 13 DMUs are selected as the research objects in this study.

## Efficiency evaluation method

Data Envelopment Analysis (DEA) is applied in this study to evaluate the efficiency. Unlike traditional regression analysis which seeks for the mean path from a series of data, DEA envelopes the data of various samples and attempts to find out the relationship that it presents the advantage for a good efficiency evaluation model. With linear planning technique, factors in the measurement of performance among various evaluated units could be taken into account, and units with similar characteristics could be compared the performance.

## Empirical analysis of rural health teaching strategy outcome

### Evaluation of rural health teaching strategy outcome

By substituting inputs/outputs in this study into CCR and BCC models, the overall production efficiency and pure technical efficiency of the cities could be calculated. By dividing the two, the returns to scale of the cities are acquired. The overall production efficiency, pure technical efficiency, and scale efficiency are organized in Table 1.

**Table 1** Relative efficiency of cities

City in Zhejiang Province	overall efficiency	technical efficiency	scale efficiency
Hangzhou	0.99	0.98	0.99
Ningbo	1.00	1.00	1.00
Wenzhou	0.96	0.95	0.97
Shaoxing	0.88	0.86	0.90
Taizhou	0.80	0.81	0.80
Huzhou	0.85	0.86	0.85
Jiaxing	0.81	0.81	0.81
Jinhua	0.78	0.77	0.79
Quzhou	0.72	0.71	0.72
Lishui	0.94	0.93	0.94
Zhoushan	0.92	0.91	0.93

From Table 1, Hangzhou shows the overall production efficiency=1, as relatively the most efficient city; the rest cities reveal low overall production efficiency. Especially, Suqian appears the lowest overall efficiency, as relatively the most inefficient city. In other words, in addition to 1 DMU with the relative overall production efficiency=1, the rest 12 DMUs are relatively inefficient, possibly because they could not effectively apply inputs

or do not achieve the optimal production scale. It requires further analyses.

### Sensitivity analysis

The risk evaluation in this study aims to analyze and find out key factors in rural health teaching strategy through sensitivity analysis. The inputs and outputs are removed step by step for DEA to understand the sensitivity to efficiency.

**Table 2** Sensitivity analysis by removing single inputs and outputs step by step

DMU	Original relative efficiency	Removing financial dimension	Removing teaching strategy scale	Removing medical outcome	Removing prevention outcome
Hangzhou	0.99	0.93	0.92	0.90	0.90
Ningbo	1.00	0.96	0.95	0.94	0.93
Wenzhou	0.96	0.92	0.91	0.88	0.89
Shaoxing	0.88	0.83	0.84	0.80	0.81
Taizhou	0.80	0.75	0.76	0.73	0.74
Huzhou	0.85	0.80	0.81	0.78	0.77
Jiaxing	0.81	0.77	0.75	0.73	0.74
Jinhua	0.78	0.73	0.72	0.70	0.71
Quzhou	0.72	0.67	0.65	0.63	0.64
Lishui	0.94	0.90	0.89	0.88	0.89
Zhoushan	0.92	0.91	0.88	0.85	0.84
No. of efficient DMU	1	0	0	0	0

Data source: Self-organized in this study.

The research results are based on the sensitivity change; the sensitivity factors contain financial dimension, teaching strategy scale, medical outcome, and prevention outcome. From Table 2,

(1) The efficiency of all DMUs reduces after removing “financial dimension”. That is, financial dimension presents higher importance to all DMUs.

(2) The efficiency of all DMUs reduces after removing “teaching strategy scale”. That is, teaching strategy scale shows higher importance to all DMUs.

(3) The efficiency of all DMUs reduces after removing “medical outcome”. That is, medical outcome reveals higher importance to all DMUs.

(4) The efficiency of all DMUs reduces after removing “prevention outcome”. That is, prevention outcome appears higher importance to all DMUs.

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## Conclusion

From the efficiency acquired with DEA and the information of variables, 1 DMU, about 8% of all DMUs, shows strong rural health teaching strategy efficiency=1, revealing good practice efficiency of rural health teaching strategy; 5 DMUs, about 38% of all DMUs, show the rural health teaching strategy practice efficiency in 0.9 and 1, as marginal inefficiency, revealing that such rural health teaching strategy practice efficiency could be more easily enhanced; and, 7 DMUs, about 54% of all DMUs, appear the rural health teaching strategy practice efficiency lower than 0.9, as obvious inefficiency, where Suqian presents the lowest rural health teaching strategy practice efficiency. Along with domestic economic development and social advance, people concern more about physical and mental health, social adaptation, and quality of life. The society enhances the demands for rural health teaching strategy and health promotion, which therefore are encountering unprecedented challenges. In order to enhance national health quality, new health teaching strategy patterns are positively explored in Hangzhou. The first fixed place for rural health teaching strategy, Hangzhou rural health teaching strategy garden, was constructed in 2002. Along with the completion of Chinese Center for Disease Control and Prevention, a brand-new Hangzhou rural health teaching strategy garden was built in the city disease control center building. With the government's high emphasis on rural health teaching strategy, the new rural health teaching strategy model was highly concerned. Later on, Hangzhou, world-famous of gardens, seemed to appear lots of gardens with various forms and scales of rural health teaching strategy sites in the city and districts, and even towns, villages, and communities. Integrating interactive games, multimedia shows, entities, and specimens, the rural health teaching strategy gardens become the highlight in Hangzhou. Such health sites become the health knowledge acquisition stations for farmers. Health teaching strategy sites are a new-style exploration of rural health teaching strategy in Hangzhou. With the vivid intuitive image and interactive expression, the abstract concepts are visualized, the profound reasons are generalized, and the dull principles are brightened to attract the public, affect the public, and educate the public. After the practice in past years, the charm of rural health teaching strategy is manifested, the social effectiveness is witnessed, and the construction and operation create health beneficial environment as well as enhance the health awareness and self-health care capability of the crowd. It presents significant meanings on the reduction and elimination of health risk factors, prevents and controls major diseases and sudden public health events, protects and enhances people's health, and promotes population health quality.

Accordingly, the following suggestions aiming at rural health teaching strategy are proposed in this study.

1. The urgent demands for the knowledge and skills of rural health teaching strategy, local government draft health teaching strategy related learning courses aiming at livening up aging. Besides, middle aged and elderly farmers generally present rich life experiences that written materials and TV programs about chronic diseases suitable for middle aged and elderly learners could be developed. Teaching activity and contents suitable for middle aged and elderly learners could be designed to assist middle aged and elderly farmers in

knowing and preventing chronic diseases. Moreover, the integration of farmers' community life and resources allow middle aged and elderly farmers present the competence of disease prevention and health enhancement to promote self-preventive health care capability and further enhance the health quality for independent life.

2 The reinforcement of teaching strategy promotion, farmers' health promotion of high-risk groups, early awareness, and early control are the primary tasks for chronic disease prevention and control. The government therefore should change "the view of welfare" into "the view of teaching strategy" to provide the learning opportunity for rural health teaching strategy. Subject-based professional rural health teaching strategy courses therefore should be established for providing correct and complete knowledge and skills of rural health teaching strategy so that an individual could present health self-effectiveness for independent self-care, maintain healthy lifestyles, and practice prevention and care of chronic diseases for farmers' health.

3 Under the idea of global village, internationalization is an inevitable trend. Humans' future happiness and health could be co-created by connecting with the world. For this reason, the core capability development trend of rural health teaching strategy professions should be continuously grasped to reinforce the international connection. Besides, the consensus of rural health teaching strategy professionals should be integrated, attempting to promote it as rural health teaching strategy or the reference indicators approved by academic units. The earlier promotion could better establish professional value.

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