

Original Research Article

A Study on the Effect of Fiscal Expenditure on Public Health and Residents' Satisfaction: A Case Study of Bengbu, China

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Abstract: In order to understand the effect of financial expenditure on the grass-roots public health services, the authors conducted a questionnaire survey on residents of Bengbu, Anhui Province. In addition, the weighted TOPSIS method is adopted to analyze the effect of financial investment in the grass-roots public health services from the perspective of residents, thus finding the problems in the grass-roots public health services. Finally, this paper puts forward some suggestions, such as increasing the financial investment in the grass-roots public health services, and improving the supervision and management mechanism of financial investment.

Keywords: Public Health Expenditure; Basic Public Health Services; Financial Investment; TOPSIS Method

1. Introduction

In recent years, China's financial expenditure on health care has increased year by year. Among them, the scale of financial investment in grass-roots public health services increased significantly. But what is the effect of public health expenditure on the improvement of grass-roots public health services? In order to understand the role of financial expenditure in improving public health services at the grassroots level, the authors conducted a questionnaire survey on residents of Bengbu, Anhui Province to explore the status of public health services at the grass-roots level and residents' satisfaction.

2. Research ideas

At present, many scholars have studied the role of fiscal expenditure in the field of grass-roots public health services. Lin Xiuyan and Wang Hong (2019) found that public health investment can promote the improvement of rural medical security level and help to narrow the gap between urban and rural areas in China. Zheng Xiyang (2019) found that health expenditure can not only significantly improve the health level of residents, but also reduce the health expenditure. Aoqin and Jaligo (2018) believe that urban residents have a higher awareness of health care and basic public health services than rural residents. Zhang Aijun and Xu Lingzhong (2018) found that the community public health prevention and control lacked a perfect organizational system, and the residents lacked a correct understanding of the grass-roots public health prevention and control as well.

To sum up, most of the current research is based on the scale of public health expenditure. From the perspective of residents, this paper analyzes the effectiveness of financial investment in public health services at the grass-roots level. Through the empirical analysis of the current situation of public health services and residents' satisfaction, the effect of

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financial expenditure on the improvement of public health services is obtained.

3. Residents' cognition of grass-roots public health services

3.1 Lack of residents' cognition

The results show that the residents do not know enough about the basic public health services. Of all the respondents, 38.2% said that their understanding of the grass-roots public health services was "average"; 27.34% of them didn't know much; 22.85% of them knew detail information; the rest of the respondents didn't know anything.

3.2 Diversified cognitive channels of residents

By investigating the ways of residents to understand the knowledge of grass-roots public health, it has been found that most of the respondents learned the information of grassroots public health through TV news and micro blog. In addition, 49.81% of the respondents obtained information through the publicity of the residents. 46.44% of them acquired knowledge through their relatives and friends, while another 26.97% learned about public health in other ways. Generally speaking, residents mainly understand the basic public health knowledge through newspapers, television and the Internet.

3.3 The popularity of basic public health services needs to be improved

Of all the respondents in this survey, 44.57% of them had received vaccination services. At the same time, 40.07% of the respondents have received health education services. In addition, only 26.97% had accepted the management of residents' health records. Another 22.1% of the respondents declared to receive the health management services of hypertension and diabetes from the grass-roots public health services. The number of respondents who had accepted other projects is even smaller, such as maternal health management. These data show that basic public health services are not well popularized.

4. Comprehensive evaluation of grass-roots public health services

In order to understand the effect of financial investment in the field of grass-roots public health services, the authors investigated the residents' enjoyment of grass-roots public health services. On this basis, from the perspective of residents' satisfaction, TOPSIS method is adopted to evaluate the implementation of public health services in Bengbu.

4.1 Normalize the data

The original data needs to be normalized to eliminate the dimension and make the data comparable. The principle of data normalization is as follows:

$$Y_{ij} = \frac{X_{ij}}{\sqrt{\sum_{i=1}^n (X_{ij})^2}}$$

Where $i=1,2,\dots,n$; $j=1,2,\dots,m$. X_{ij} represents the value of the i^{th} evaluation object on the j^{th} index. The matrix Z is obtained by normalizing the value of the matrix.

$$Z = \begin{bmatrix} 0.293568025 & 0.289654258 & 0.283030172 & 0.296841327 \\ 0.276142511 & 0.279461824 & 0.284461257 & 0.279641355 \\ 0.360138647 & 0.294367182 & 0.350246379 & 0.306971354 \\ 0.315791341 & 0.298613816 & 0.301687362 & 0.298346872 \\ 0.341894625 & 0.293164827 & 0.311793425 & 0.289413587 \\ 0.274681646 & 0.289413572 & 0.291352465 & 0.281354792 \\ 0.289625735 & 0.296653241 & 0.299066317 & 0.286542738 \\ 0.304627124 & 0.284675136 & 0.297168946 & 0.301428572 \end{bmatrix}$$

4.2 Determine the weight

The implementation of grass-roots public health services needs to be evaluated through performance appraisal. Therefore, combined with the needs of the investigation, the evaluation index system of basic public health services has been established. The weight value of the required indicators is obtained, as shown in **Table 1**.

First level indicators	Secondary index	Scores	Project weight
Project implementation	Residents' health records	6	0.21
	Health education	4	0.1
	Vaccination	5	0.18
	Health management services for children aged 0 to 6	5	0.17
	Maternal health management services	5	0.13
	Health management for the elderly	4	0.1
	Health management of patients with hypertension and diabetes	4	0.11

Table 1. Indicators and weight of grass-roots public health services

4.3 Get the sorting results

The weighted matrix s can be calculated by substituting the weight of each term into the normalized matrix Z . Then, according to the results of weighted matrix s , the authors calculate the positive and negative ideal solutions of weighted matrix s , which are represented by S^+ and S^- respectively:

$$S^+ = \{0.0349815273611733, 0.0329645521476254, 0.033571542745475\}$$

$$S^- = \{0.0114673592243571, 0.0116803711915373, 0.011257647664264\}$$

The Euclidean norm is used to measure the distance. According to the formulas (1) and (2), the Euclidean distance between the seven basic public health service items and the positive and negative ideal solutions is calculated, which are expressed by a and B respectively

$$D_i^+ = \sqrt{\sum_{j=1}^m (S_{ij} - S_j^+)^2} \quad i=1,2,\dots,n \quad (1)$$

$$D_i^- = \sqrt{\sum_{j=1}^m (S_{ij} - S_j^-)^2} \quad i=1,2,\dots,n \quad (2)$$

Calculate the relative paste progress C_i according to formula (3), and sort it according to the relative paste progress C_i ,

$$C_i = \frac{D_i^-}{D_i^+ + D_i^-} \quad i=1,2,\dots,n \quad (3)$$

Organize the results as shown in **Table 2**.

Evaluating indicator	D^+	D^-	C_i	Sort
Residents' health records	0.003029276	0.045013428	0.93694618	1
Health Education	0.025637541	0.020672583	0.446394464	7
Vaccination	0.006574513	0.044369754	0.870946951	2
Child health management	0.010249457	0.038564626	0.790030738	3
Maternal health management	0.011725863	0.037143821	0.760058547	4
Health management for the elderly	0.024972182	0.023487563	0.484681935	6
Health management of hypertension and diabetes	0.024725464	0.024154466	0.494159177	5

Table 2. Comprehensive ranking results of evaluation indexes

4.4 Result analysis

According to the survey, the current financial investment in basic public health services is still the main work of the government in health care. Residents' satisfaction with basic public health service projects is a strong basis for judging the effectiveness of project implementation. The weighted TOPSIS method is adopted to get the residents' satisfaction evaluation of basic public health service projects. By sorting the project evaluation, the following results can be obtained: the residents' health file project has the highest satisfaction evaluation among all basic public health service projects; the vaccination project ranks second; the children's health management ranks third, followed by the maternal health management, the hypertension and diabetes health management, the elderly health management and health education in turn.

The scores of elderly health management project and hypertension and diabetes health management project are low, which shows that there is a lack of basic public health services for residents with hypertension and other chronic diseases. Therefore, the local government should strengthen the further support of these two health management projects to meet the health needs of special groups in the community and village. The health education program has the lowest scores and the lowest ranking. This result indicates that the government needs to strengthen the publicity of health education.

5. Main recommendations

5.1 Increase the financial investment in the grass-roots public health service sector

Through the investigation, it has been found that compared with large hospitals, the comprehensive ability of medical staff in the grass-roots public health service departments is relatively poor, and the medical and health resources are scarce. The government should increase investment in village clinics, township hospitals and community hospitals. In particular, it is necessary to improve the professional skills of the medical staff in the grass-roots public health service departments. The government should attract more excellent medical workers to participate in the grass-roots public health departments, and purchase new medical devices for the grass-roots public health service departments in time, so as to improve the service capacity of the grass-roots public health service departments.

5.2 Strengthen the transfer payment and improve the legal and policy system

The government should increase the transfer payment of medical resources in rural areas and towns to further narrow the gap between urban and rural areas. In addition, the government should improve the legal system with clear responsibilities and strictly enforce the law in the process of comprehensive management planning of medical and health system, so as to further play the legal effect. The government should also set up a long-term incentive and restraint mechanism to ensure the sustainable development of basic health services, so that the health of the masses can be maintained and guaranteed.

5.3 Improve the supervision and management mechanism of financial investment in health care

The government should improve the performance appraisal system of financial investment in the field of health care, bringing disease prevention, medical care and other work into the long-term management of grass-roots public health services. The supervision and management of basic public health services is conducive to gradually improving the quality of community health services so as to truly meet the needs of residents. In addition, in rural health services, the state should strengthen the medical service level of village clinics and township hospitals, and improve the quality of community health services. Moreover, the relevant performance evaluation mechanism should be established, taking the evaluation results of prevention and control of daily diseases and active response to public health events as the evaluation criteria of wages and benefits, so as to stimulate the enthusiasm of staff.

5.4 Establish a new modern operation system

It is necessary to comprehensively improve the networking of grass-roots public health service systems and strengthen the collection of public health data and information. In addition, developing and using the intelligent public health service system to establish the residents' health archives will be conducive to the popularization of basic health consultation and residents' health files, thus improving the efficiency and quality of public health services.

5.5 Strengthen the publicity and education of health concept

The quality of public health environment is not only related to the quality of life, but also to the sustainable development of the whole society. Relevant departments should expand the level of health publicity and education and narrow the gap between urban and rural areas. The significance of public health can be publicized by means of video advertisement and network media. Through the communication between community health service center and the masses, the publicity of public health awareness can be strengthened and the participation of residents improved.

5.6 Form information sharing and feedback mechanism

A government community public disease prevention and control system should be established with the government as the leading role and the health sector as the main body. Local governments should give full play to social forces, effectively integrate and utilize public health resources at the grassroots level, so as to improve the level of disease prevention and control at the grassroots level; at the same time, they should make full use of the Internet, unblock the channels of public supervision and feedback and information sharing, and achieve information transparency and efficient service.

6. Conclusion

At present, the global epidemic in 2020 is a crisis in the field of public health, which reminds everyone that the improvement of public health services is of great significance to the health of residents and the stability of the country. The questionnaire survey of residents in Bengbu, China revealed the problems of finance in the field of public health services. Finally, the paper puts forward some policy suggestions. It is hoped that this study can improve the importance of public health in various regions and provide reference for the establishment of a more perfect grass-roots public health mechanism.

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