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ORIGINAL RESEARCH

Evaluation of the Results of China's Fiscal Medical and Health Expenditure

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Purpose: To evaluate the resulting level of fiscal medical and health expenditure in China, and to provide the scientific basis for further improving fiscal medical and health service capacity in China.

Patients and Methods: The data envelopment method and Gini coefficient method were used to analyze the efficiency and regional fairness of fiscal medical and health expenditure results by using the relevant provincial and municipal data of China from 2007 to 2019.

Results: 1.Overall, from 2007 to 2019, the total expenditure continued to increase, the expenditure efficiency increased first and then decreased, and the expenditure fairness continued to improve. 2. From the perspective of subregions, there are apparent differences between regions in terms of total expenditure, expenditure efficiency, and expenditure fairness, showing a better situation in the central, western, northeast and a lower situation in the east.

Conclusion: The overall level of fiscal medical and health expenditure in China shows an upward trend, but there is still much room for improvement. At the same time, there are pronounced regional differences, and the problems of efficiency and fairness coexist among regions. Therefore, in the future, we should increase medical and health investment and enhance the government's close attention; Improve the expenditure performance appraisal system; Formulate policies according to local conditions and avoid "one size fits all.".

Keywords: fiscal medical and health expenditure, efficiency of expenditure results, fairness of expenditure results, regional differences, government attention

Introduction

As the essential part of the basic public services, medical and health services are an important part of the country's stable economy and the development of public policy, as well as the key to ensuring infrastructure and meeting public demand. In particular, the fifth Plenary Session of the 19th CPC Central Committee set shared prosperity as one of the long-term goals of national economic and social development by 2035. It equalized access to essential public services as an important part of achieving shared prosperity. Improving the level of medical and health services is a manifestation of the concept of putting the people first in governance and a necessary part of achieving shared prosperity. In China, state finance mainly supports and guarantees medical and health services. The level of government fiscal expenditure directly determines the level of medical and health services. Therefore, improving the level of medical and health services must increase the level of government expenditure in the medical and health benefits field. In addition, in October 2020, the CPC Central Committee's Proposal on the formulation of the 14th Five-Year Plan for National Economic and Social Development and the Long-term Goals of 2035 proposed establishing a stable public health investment mechanism. To develop a common public health investment mechanism, we need to have a reasonable understanding of the current situation and existing problems of China's fiscal medical and health expenditure. In particular, downward pressure on the world economy has been increasing and the growth rate of fiscal revenue of different countries has been declining with the outbreak of COVID-19. At the same time, to recover economic growth, the government will have to increase fiscal

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spending on health care to deal with COVID-19. Therefore, in the context of slowing government revenue and increasing expenditure pressure, the government must use fiscal medical and health funds efficiently. To efficiently use fiscal medical and health funds, we need to correctly understand and analyze the current situation and problems of fiscal medical and health expenditure in China. We focus our research on China's provincial governments on estimating this problem since China has adopted a governance model of political centralization and economic decentralization. China's regional governments have assumed the function of providing public services directly to the people. Therefore, this study analyzes Chinese provincial governments' fiscal health expenditure data from 2007 to 2019 to provide policy suggestions for the government to formulate relevant policies. The difference between this paper and previous studies is that this paper studies the overall fiscal health expenditure in China rather than some parts of China. For example, Li Wang empirically analyzed the performance difference of public health expenditure in the context of Beijing-Tianjin-Hebei coordination. It proposed that Beijing-Tianjin-Hebei should balance regional development, control the growth of the medical expenditure scale, and unify medical and health policies.[1] Zhongming Liu studied the fiscal guarantee system and mechanism for equalizing essential public health services in Zhejiang Province and suggested improving the equalization level of important public health services in Zhejiang Province.[2] The scope of this paper is the national level of China. In addition, the time of existing research data is short, the research conclusions are inconsistent, and the efficiency and fairness of fiscal medical and health expenditure results are not comprehensively analyzed. As in the medical and health care expenditure efficiency, Chunfang Li's data envelopment analysis (DEA) method is applied to evaluate the efficiency of the towns and townships, pointing out that the lower the overall efficiency of cities and townships.[3] Zhongfang Zhang thinks local government fiscal health expenditure efficiency exists significant regional differences.[4] Jingming Wei data based on the hospital, 11 counties of Zhejiang province medical were to evaluate the efficiency of the body; It is suggesting that to optimize the allocation of health resources, strengthen the infrastructure of primary medical institutions and improve the management level of county-level hospitals.[5] Haixiang Xiao proposed that the reform and improvement of the fiscal decentralization system is a critical way to improve the efficiency of government fiscal medical and health expenditure.[6] In terms of healthcare spending fairness, Zhong Wei thinks that China's public health investment lack right and suggested that under the condition of invariable in the public health budget, take measures to guide medical subsidies to rural areas.[7] By analyzing the progress and fairness of implementing national basic public health service projects, Wang Fang suggested that we pay attention to project cost calculation, reasonably determine service projects, and innovate grass-roots public health service models.[8] Jinping Pei pointed out that the regional differences in fiscal medical and health expenditure in China are prominent, and the regional differences in the eastern region are more pronounced than those in the central and western regions.[9] Liankui Wen analyzed the period from 2003 to 2013 due to the implementation of the equalization policy of public health services and believed that the overall fairness of the inter-provincial government fiscal medical and health expenditures increased.[10] Therefore, based on the above research, this paper analyzes from the perspectives of total expenditure and expenditure management. This article uses China's 2007–2019 provincial and municipal data to conduct research and analysis at the national level. This paper uses the data envelopment method and the Gini coefficient method to analyze the efficiency and regional fairness of China's fiscal medical and health expenditure results and puts forward relevant policy suggestions. Furthermore, this paper also provides experience and references for relevant academic research in other developing countries in the future.

The main innovations of this paper are as follows: 1. This paper makes a comprehensive analysis of China's fiscal medical and health expenditure. Compared with the existing literature, the conclusion is more accurate and complete, filling the gap in the current related research fields. 2. This paper constructs the expenditure efficiency index system according to the Chinese government revenue and expenditure classification. At the same time, this paper uses the relevant data of 30 provinces in China from 2007 to 2019 to evaluate the efficiency level of China's overall fiscal health expenditure results from the perspective of regional differences. Compared with the existing literature, the research data of this paper is new, the research time is long, and the research content and angle are more in line with China's reality. 3. This paper analyzes the regional fairness of fiscal medical and health expenditure results by using the manually collected data of fiscal medical and health expenditure of 286 prefecture-level cities in China from 2007 to 2019. Compared with the existing literature, the research data in this paper are more accurate and unique, the research time is long, and the

research content and angle are more in line with the actual situation in China. 4. This paper's research results will help to understand the current situation of China's fiscal health expenditure results and provide experience for other developing countries. The follow-up arrangement of this paper is as follows: In the background analysis part, this part evaluates China's fiscal medical and health expenditure from 2007 to 2019 from the perspective of total expenditure to draw the direction of further research on the evaluation of expenditure efficiency and the regional fairness of expenditure results. Research methods mainly explain the methods used in this study. In the part of research results, according to the existing research methods, this paper makes a detailed analysis of the efficiency level and regional fairness of China's fiscal health expenditure results. Discussion and policy recommendations, which put forward corresponding policy recommendations based on the above research conclusions.

Background Analysis

National Situation

First, We can analyze the importance of China's fiscal medical and health expenditure from 2007 to 2019 according to Table 1. China's fiscal medical and health expenses accounted for less than 7% in terms of fiscal revenue and fiscal expenditure and less than 3% in economic aggregate. Because China's provincial governments still focus on economic development and do not pay enough attention to medical and health services. In addition, from the perspective of the proportion of fiscal medical and health expenditure in people's livelihood fiscal expenditure, China's fiscal medical and health expenditure accounts for less than 1/3 of the people's livelihood fiscal expenditure, which is far lower than the expenditure on education and social security. At the same time, the US government spends 42% on health in the same three areas. It also verifies the previous explanation, indicating that the current Chinese government's emphasis on medical and health care is relatively insufficient.

Secondly, we can analyze the growth trend of China's fiscal medical and health expenditure from 2007 to 2019 according to Table 1. The overall proportion of total fiscal revenue and total fiscal expenditure of fiscal health expenditure from 2007 to 2019 shows an increasing trend year by year. It shows that the government has made some efforts to improve medical services. However, the overall economy and the proportion of people's livelihood fiscal

Table 1 Proportion of China's Fiscal Medical and Health Expenditure

Time	Proportion of Fiscal Medical and Health Expenditure in Total Fiscal Revenue	Proportion of Fiscal Medical and Health Expenditure in Total Fiscal Expenditure	Proportion of Fiscal Medical and Health Expenditure in Total GDP	Proportion of Fiscal Medical and Health Expenditure in People's Livelihood Fiscal Expenditure
2007	4.39%	5.13%	0.91%	14.36%
2008	4.79%	4.79%	1.05%	15.40%
2009	5.64%	5.64%	1.42%	18.04%
2010	5.65%	5.65%	1.40%	18.67%
2011	5.94%	5.94%	1.54%	19.38%
2012	5.70%	5.70%	1.55%	18.06%
2013	5.97%	5.97%	1.59%	19.03%
2014	6.75%	6.75%	1.80%	21.20%
2015	6.14%	6.14%	2.03%	21.34%
2016	6.24%	6.24%	2.05%	21.41%
2017	6.69%	6.69%	2.10%	21.41%
2018	6.76%	6.76%	2.09%	21.36%
2019	6.82%	6.82%	2.08%	21.02%

Notes: This section uses data from 2007–2019 because of data availability and comparability. In 2007, the Chinese government reformed the caliber of fiscal expenditures. Before 2007, the Chinese government did not list fiscal medical and health expenditures separately but only arranged for science, education, culture, and health services. After the 2007 reform of fiscal expenditure caliber, the Chinese government officially listed fiscal medical and health expenditure separately. The data is as of 2019 because China's official statistical yearbook is only updated to 2020, and the 2020 statistical yearbook reflected the relevant situation in 2019.All the data in the above table comes from the 2008–2020 China Fiscal Yearbook and China Statistical Yearbook. According to relevant academic research, fiscal expenditure on people's livelihood mainly refers to fiscal expenditure on education, medical treatment, and social security.

expenditure have demonstrated the possibility of decline since 2017 because the global economic situation is still not optimistic in 2016. The GDP growth rate of China's major trading partners, such as the United States and Europe, has slowed to 1.6%. Affected by this, China is under increasing pressure on economic growth and people's employment. To promote economic growth and stabilize people's work, the relative importance of the government in the medical and health sector has shown a downward trend.

Regional Conditions

Proportion of Total Fiscal Revenue/Expenditure and GDP

As shown in Tables 2–4, first, whether in the Eastern region, the Central region, the Western region, or the Northeast region, the overall trend is on the rise, but the overall proportion is not high. This situation is also because the current government is mainly concerned with economic development, and the emphasis on medical and health care needs to be improved. Secondly, the Central and Western regions are higher than the National average, and the Eastern and Northeast regions are lower than the national average. Because the eastern and northeastern areas have a good industrial base and system, they are more responsible for economic development in the national financial system. When faced with the pressure of an economic downturn, local governments in the region do their best to boost the economy, resulting in a relatively lower emphasis on medical and health services than in the Central and Western areas.

Proportion of Fiscal Expenditure for People's Livelihood

As shown in Table 5, first, whether in the eastern region, the central region, the western region, or the northeastern region, the relative importance of the overall government needs to be improved, consistent with the general situation in the previous article. Secondly, since 2015, the proportion of the eastern, central, western, and northeastern regions has shrunk, and the absolute value of the reduction in the eastern, central, and western areas is relatively high. It is mainly affected by two factors: the regional industrial structure.[11] The industrial structure of the Northeast region is primarily based on heavy industry and agriculture, and its population and employment problems are relatively stable The industries in the eastern, central, and western regions are mainly service and manufacturing, which are greatly affected by the economic situation. Under the dual pressure of economic development and population employment, the relative importance of the governments of the eastern, central, and western regions to medical and health services has declined more significantly. The second is the aging of the regional population.[12] The population aging problem in Northeast China is serious, and the proportion of

Table 2 Proportion of Medical and Health Expenditure in Total Fiscal Revenue by Region

Time	Eastern China	Central China	Western China	Northeast China
2007	4.99%	5.17%	5.45%	4.39%
2008	4.76%	5.02%	4.92%	3.92%
2009	5.09%	6.25%	5.70%	5.99%
2010	5.26%	6.16%	5.88%	5.06%
2011	5.57%	6.71%	6.09%	5.09%
2012	5.49%	6.39%	5.81%	4.65%
2013	5.72%	6.70%	6.11%	4.82%
2014	6.52%	7.58%	6.85%	5.52%
2015	5.61%	7.11%	6.37%	5.11%
2016	5.76%	7.21%	6.43%	5.19%
2017	6.22%	7.74%	6.93%	5.28%
2018	6.36%	7.73%	6.98%	5.30%
2019	6.54%	7.60%	7.02%	5.50%
Total rate of change	+31.06%	+47%	+28.81%	+25.28%

Notes: The regional division of this paper is mainly based on the economic region division of the National Bureau of Statistics of China. The east includes: Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan. The central part includes Shanxi, Anhui, Jiangxi, Henan, Hubei, and Hunan. The west includes Neimenggu, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Xizang, Shanxi, Gansu, Qinghai, Ningxia, and Xinjiang. The northeast includes Liaoning, Jilin, and Heilongjiang.http://www.stats.gov.cn/ztjc/zthd/sjtjr/dejtjkfr/tjkp/201106/t20110613_71947.htm.

Table 3 Proportion of Fiscal Medical and Health Expenditure in Total Fiscal Expenditure by Region

Time	Eastern China	Central China	Western China	Northeast China
2007	4.29%	4.39%	4.64%	3.78%
2008	4.76%	5.02%	4.92%	3.92%
2009	5.09%	6.25%	5.70%	5.99%
2010	5.26%	6.16%	5.88%	5.06%
2011	5.57%	6.71%	6.09%	5.09%
2012	5.49%	6.39%	5.81%	4.65%
2013	5.72%	6.70%	6.11%	4.82%
2014	6.52%	7.58%	6.85%	5.52%
2015	5.61%	7.11%	6.37%	5.11%
2016	5.76%	7.21%	6.43%	5.19%
2017	6.22%	7.74%	6.93%	5.28%
2018	6.36%	7.73%	6.98%	5.30%
2019	6.54%	7.60%	7.02%	5.50%
Total rate of change	+52.45%	+73.12%	+51.29%	+45.50%

Table 4 Proportion of Fiscal Medical and Health Expenditure in GDP by Region

Time	Eastern China	Central China	Western China	Northeast China
2007	0.65%	0.79%	1.26%	0.74%
2008	0.76%	0.94%	1.43%	0.80%
2009	0.91%	1.34%	1.93%	1.38%
2010	0.94%	1.29%	1.96%	1.13%
2011	1.05%	1.47%	2.12%	1.18%
2012	1.09%	1.50%	2.10%	1.14%
2013	1.13%	1.59%	2.12%	1.18%
2014	1.30%	1.81%	2.38%	1.34%
2015	1.43%	2.04%	2.70%	1.52%
2016	1.45%	2.02%	2.71%	1.69%
2017	1.44%	2.01%	2.84%	1.73%
2018	1.49%	2.00%	2.80%	1.70%
2019	1.53%	1.89%	2.69%	2.06%
Total rate of change	+135.38%	+139.24%	+113.49%	+178.37%

Table 5 Proportion of Fiscal Medical and Health Expenditure in People's Livelihood Fiscal Expenditure by REGION

Time	Eastern China	Central China	Western China	Northeast China
2007	15.23%	13.41%	14.94%	11.25%
2008	16.51%	14.93%	15.58%	11.98%
2009	17.90%	18.77%	17.88%	17.61%
2010	18.53%	19.41%	18.91%	16.54%
2011	19.25%	20.38%	19.58%	16.75%
2012	18.31%	18.71%	18.35%	14.78%
2013	19.05%	19.88%	19.42%	15.86%
2014	21.31%	22.35%	21.39%	17.83%
2015	21.05%	22.84%	21.77%	17.77%
2016	21.38%	22.62%	21.70%	18.04%
2017	21.22%	22.55%	22.09%	17.29%
2018	21.36%	22.45%	22.04%	16.66%
2019	21.11%	22.08%	21.59%	16.52%
Total rate of change	+38.61%	+64.65%	+44.51%	+46.84%

people over 65 years old in Northeast China is 16.39% of the total population. This status quo makes the fiscal medical and health expenditure in the region rigid, so compared with the eastern, central, and western areas, the decline in the northeast region is more diminutive.

Based on the above analysis, we can find regional differences in the Chinese government's medical and health expenditure. Therefore, in the subsequent analysis of the efficiency of expenditure results and the regional fairness of expenditure results, this paper analyzes from the perspective of regional differences.

Methods

Efficiency Evaluation Method of Fiscal Medical and Health Expenditure Results

At present, the academic circles mainly use two methods to evaluate efficiency: Data Envelopment Analysis[13–23] and stochastic frontier analysis.[24,25] Data envelopment analysis is the most widely used and applicable nonparametric test method. Compared with the stochastic frontier method, it does not need to set the function form or distribution hypothesis, so it can effectively reduce the model error. At the same time, data envelopment analysis can better analyze the efficiency of high-yield situations.[24,25] In basic public services, data envelopment analysis has more advantages. Therefore, this paper uses the DEA model for evaluation.

Model Setting

DEA mainly includes two modes: CCR and BCC. CCR is an efficiency measurement method proposed by Charnes, Cooper, and Rhodes[26] under the assumption of constant return to scale. BCC is an efficiency evaluation method offered by Banker, Charnes, and Cooper[27] under the premise of variable return to scale. Considering the scale effect of essential public service expenditure, we select the second one for analysis. The specific settings are as follows:

According to the variable return to scale theory, we assume that there are H decision-making units $(dum_j, j = 1, 2, 3, \cdots H)$, and each dum contains M inputs X and N outputs Y. We can obtain the following model:

$$Max\widehat{\theta k} = \theta k + \varepsilon\left(\sum_{r=1}^{N} S_{rk}^{+} + \sum_{i=1}^{M} S_{ik}^{-}\right)$$

$$\text{st.} \sum_{k=1}^{H} \lambda_k x_{ik} + S_{ik}^{-} = x_{ik}$$

$$\sum_{k=1}^{H} \lambda_k y_{rk} - S_{rk}^{+} = \theta_k y_{rk}$$

$$\sum_{\mathrm{k}=1}^{H} \lambda_{\mathrm{k}} = 1; \lambda_k, S_{rk}^{+}, S_{rk}^{-} \geq 0 (i = 1, \cdots, K; r = 1, \cdots, N; k = 1, \cdots, M)$$

where $\varepsilon$is the non Archimedean number,S_{rk}^{+}andS_{rk}^{-}represent the output evaluation standard and input evaluation standard respectively; $\lambda$is the weight;$\hat{\theta}_{\mathrm{k}}$represents the input-output efficiency of the k-th decision-making unit. Where$0 \leq \hat{\theta}_{\mathrm{k}} \leq 1$, when$\hat{\theta}_{\mathrm{k}} = 1$ indicates that the evaluated unit is efficient and is an effective unit; When $0 \leq \hat{\theta}_{\mathrm{k}} < 1$, it means that the evaluated unit is inefficient or inefficient, which is invalid or inefficient.

Index Selection and Data Description

According to the government revenue and expenditure classification subjects over the years, data availability, and relevant academic research, we constructed the efficiency index system of fiscal medical and health expenditure in Table 6.

According to the above index system, finally, this paper can only evaluate the efficiency value of fiscal medical and health expenditure results in 30 provinces except for Xizang, Hong Kong, Macao, and Taiwan from 2007 to 2019.

Evaluation Method for the Regional Fairness of Fiscal Medical and Health Expenditure Results

At present, the academic circles mainly use the Gini coefficient and generalized entropy index to measure the fairness of results, among which the Gini coefficient is widely used.[28–33] The Gini coefficient is calculated according to the Lorentz

Table 6 Input-Output Index System of Fiscal Medical and Health Expenditure

Input Index	Output Indicators		Data Sources
Fiscal medical and health expenditure (10,000 yuan)	Number of medical and health institutions	Including: number of hospitals, grass-roots medical and health institutions, professional public health institutions and other medical and health institution	China Health Statistics Yearbook, China fiscal Yearbook and EPS data platform
	Number of health personnel	These include: health technicians, rural doctors and health workers, other technicians, managers and skilled workers	
	Number of beds in medical institutions	Including: hospital beds, beds in primary medical and health institutions, beds in professional public health institutions and beds in other medical and health institutions	

curve and specific formula to obtain the overall fairness. As a standard statistical analysis method, it can be used in the research of income distribution and is widely used in many social fields such as property, population, crime, race, education, medical treatment, and so on.[32–35] Therefore, this paper uses the Gini coefficient to evaluate the fiscal medical and health expenditure results fairness.

Model Setting

This paper adopts the calculation formula of Gini coefficient of unequal grouping:[36]

$$G_k = 2\sum_{i=1}^{N-1} W_i(1 - V_i) - 1 + \sum_{i=1}^{N} W_i Y_i$$

Where, $G_k$represents Gini coefficient, K=Medical represents medical and health care respectively, N represents the number of prefecture level cities in each province, W is the proportion of the population of each prefecture level city in the total population of the province,Y_i is the proportion of the fiscal medical and health care expenditure of each prefecture level city in the total fiscal medical and health care expenditure of the province, and $V_i$is the cumulative count from i=1 to i.

Data Description

The fiscal medical and health expenditure data in this paper are from the statistical yearbooks of local cities, provincial fiscal yearbooks (except Ningxia fiscal Yearbook), China Urban Statistical Yearbook, and the CEIC database. At the same time, limited by the availability of data, this paper can only use the relevant data of 286 prefecture-level cities in 25 provinces in China from 2007 to 2019. Finally, this paper can only measure the Gini coefficient values of 25 provinces except for Beijing, Shanghai, Tianjin, Chongqing, Xizang, Qinghai, Hong Kong, Macao, and Taiwan from 2007 to 2019.

Results

Analysis on the Result Efficiency of Fiscal Medical and Health Expenditure

First of all, according to Table 7, we can get the relative size of the efficiency value of China's fiscal medical and health expenditure from 2007 to 2019. The average efficiency of our country's fiscal medical and health expenditure from 2007 to 2019 is 0.784, which shows that most provinces in China are relatively effective (Table 7). The average value in the eastern region is 0.746, which is lower than the National average (Table 7). The central area was 0.826, higher than the national average (Table 7). The western region was 0.768, slightly lower than the national average (Table 7). The northeast region was 0.884, higher than the national average (Table 7). The above results indicate that the current expenditure efficiency of provinces in China's eastern and western regions is poor. Cause the fact that there are more provinces with lower spending efficiency in the eastern and western regions (Table 8). The areas with low expenditure efficiency in the eastern region are mainly economically developed. It may be because the current fiscal medical and health expenditure is invested primarily in the wage expenditure of health technicians. Thus, the region's investment in essential public health facilities is relatively neglected. The areas with low expenditure efficiency in the western region

Table 7 Efficiency of China's Fiscal Medical and Health Expenditure from 2007 to 2019

Time	China	Eastern China	Central China	Western China	Northeast China
2007	0.771	0.683	0.828	0.793	0.870
2008	0.796	0.710	0.842	0.808	0.945
2009	0.764	0.749	0.826	0.778	0.642
2010	0.791	0.754	0.834	0.781	0.862
2011	0.823	0.799	0.863	0.801	0.903
2012	0.825	0.800	0.860	0.802	0.918
2013	0.828	0.786	0.857	0.823	0.924
2014	0.835	0.791	0.860	0.829	0.955
2015	0.794	0.775	0.819	0.773	0.880
2016	0.782	0.751	0.802	0.771	0.884
2017	0.729	0.712	0.791	0.671	0.876
2018	0.724	0.699	0.776	0.669	0.901
2019	0.732	0.692	0.779	0.689	0.928

are mainly economically underdeveloped, possibly due to the inefficient use of local funds. As the economy of Yunnan, Guizhou, and Qinghai is relatively backward, there are many ethnic minorities in the region. The management concept is also relatively backward, so it is difficult for the local government to achieve adequate supervision of funds, leading to low utilization of local funds.

Secondly, We can see the trend of the efficiency level of fiscal medical and health expenditure results from Figure 1. It showed a fluctuating upward trend from 2007 to 2014 (Figure 1). The whole country rose from 0.771 to 0.835, the eastern region from 0.683 to 0.791, the central region from 0.828 to 0.860, the western region from 0.793 to 0.829, and the northeast region from 0.870 to 0.955. Since the 17th National Congress of the Communist Party of China explicitly proposed strengthening medical and health services, local governments have significantly improved their expenditure efficiency. Especially with the proposal of the new medical reform policy in 2009, the expenditure efficiency of local governments has increased dramatically. It shows a downward trend from 2014 to 2019 (Figure 1). The whole country dropped from 0.835 to 0.732, the eastern region from 0.791 to 0.692, the central region from 0.860 to 0.779, the western region from 0.829 to 0.689, and the northeast region from 0.955 to 0.928. As the state relaxed the restrictions on private capital entering the medical and health field in 2013, public medical institutions decreased, and private institutions increased significantly. However, the overall fiscal resource allocation capacity has been reduced due to the lagging service capacity construction and low-scale efficiency of private medical institutions.

Analysis on the Results of Regional Fairness of Fiscal Medical and Health Expenditure

First of all, according to Table 9, we can get the relative size of the regional fairness of China's fiscal medical and health expenditure from 2007 to 2019. The average fairness of China's fiscal medical and health expenditure from 2007 to 2019 is 0.122 (Table 9), indicating that the overall fairness of China's fiscal medical and health expenditure results is good. By region, the average value of the Eastern region is 0.164, lower than the national average (Table 9). The central area is 0.097, higher than the national average (Table 9). The western region is 0.117, lower than the national average (Table 9). Northeast China is 0.092, lower than the national average (Table 9). The reasons for the common fairness of the results of fiscal medical and health expenditure in the eastern region are as follows: because the overall economic development in the eastern region is good, there is no central policy support. However, within the eastern area, there are significant differences in the level of economic development among provinces and prefecture-level cities, which leads to the poor regional fairness of the overall fiscal medical and health expenditure in the eastern region. The significant policy supports the central, western, and northeast regions, so the people within the area can enjoy equal fiscal medical and health resources.

Secondly, we can see the regional fairness trend of fiscal health care expenditure in Figure 2. From 2007 to 2019, it showed a downward trend (Figure 2). The country dropped from 0.176 to 0.108, a decrease of 39%. The eastern region

Table 8 The Efficiency Value of Fiscal Medical and Health Expenditure in China's Provinces from 2007 to 2019

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Eastern China	Beijing	0.341	0.415	0.437	0.495	0.582	0.591	0.609	0.664	0.631	0.632	0.651	0.595	0.585
	Tianjin	0.628	0.741	0.766	0.719	0.802	0.782	0.688	0.689	0.639	0.659	0.629	0.615	0.641
	Hebei	0.964	0.815	1	0.958	1	1	1	1	1	1	1	1	1
	Shanghai	0.404	0.432	0.489	0.501	0.56	0.606	0.619	0.63	0.588	0.5	0.488	0.453	0.459
	Jiangsu	0.68	0.742	0.726	0.741	0.751	0.728	0.746	0.798	0.771	0.771	0.775	0.782	0.792
	Zhejiang	0.559	0.617	0.614	0.634	0.728	0.768	0.752	0.784	0.818	0.811	0.841	0.842	0.778
	Fujian	0.585	0.614	0.806	0.734	0.808	0.803	0.786	0.76	0.667	0.663	0.632	0.645	0.652
	Shandong	0.961	1	1	1	1	1	1	1	0.987	0.93	0.978	0.972	1
	Guangdong	0.708	0.728	0.691	0.757	0.755	0.751	0.737	0.681	0.677	0.614	0.584	0.584	0.555
	Hainan	1	1	0.962	1	1	0.974	0.924	0.907	0.973	0.932	0.537	0.504	0.461
Central China	Shanxi	0.776	0.857	1	1	1	1	1	1	1	1	1	0.981	0.977
	Anhui	0.749	0.724	0.634	0.722	0.644	0.631	0.643	0.674	0.629	0.679	0.602	0.609	0.607
	Jiangxi	0.656	0.707	0.737	0.673	0.792	0.818	0.77	0.724	0.711	0.664	0.63	0.557	0.557
	Henan	0.858	0.838	0.89	0.878	0.954	0.905	0.889	0.911	0.869	0.86	0.874	0.831	0.824
	Hubei	0.927	0.924	0.809	0.795	0.816	0.856	0.853	0.864	0.747	0.705	0.733	0.811	0.803
	Hunan	1	1	0.887	0.935	0.973	0.951	0.989	0.987	0.957	0.903	0.906	0.867	0.905
Western China	Neimenggu	0.798	0.743	0.668	0.63	0.662	0.686	0.715	0.762	0.736	0.718	0.659	0.721	0.744
	Guangxi	0.815	0.785	0.78	0.669	0.705	0.737	0.76	0.782	0.733	0.701	0.698	0.688	0.71
	Chongqing	0.863	0.845	0.809	0.883	0.797	0.787	0.796	0.791	0.685	0.713	0.658	0.658	0.703
	Sichuan	0.838	0.824	0.815	0.819	0.862	0.88	0.921	0.93	0.87	0.811	0.838	0.846	0.859
	Guizhou	0.635	0.666	0.709	0.676	0.716	0.717	0.783	0.718	0.646	0.638	0.612	0.6	0.596
	Yunan	0.552	0.592	0.572	0.634	0.648	0.652	0.685	0.703	0.608	0.602	0.596	0.606	0.646
	Shanxi	0.845	0.775	0.743	0.702	0.818	0.829	0.838	0.855	0.785	0.82	0.832	0.807	0.851
	Gansu	1	1	0.782	0.83	0.772	0.86	0.863	0.864	0.833	0.801	0.757	0.756	0.755
	Qinghai	0.686	0.798	0.887	0.981	1	0.889	0.866	0.933	0.907	0.948	0.424	0.407	0.412
	Ningxia	0.979	0.955	1	0.92	1	0.969	0.963	0.953	0.992	1	0.559	0.557	0.587
	Xinjiang	0.712	0.903	0.794	0.85	0.832	0.812	0.862	0.83	0.711	0.728	0.743	0.71	0.718
Northeast China	Liaoning	0.928	1	0.666	0.95	1	1	1	1	1	1	1	1	1
	Jilin	0.911	0.943	0.617	0.801	0.81	0.788	0.771	0.867	0.757	0.736	0.71	0.777	0.815
	Heilongjiang	0.772	0.893	0.643	0.836	0.9	0.967	1	0.997	0.882	0.916	0.917	0.927	0.97

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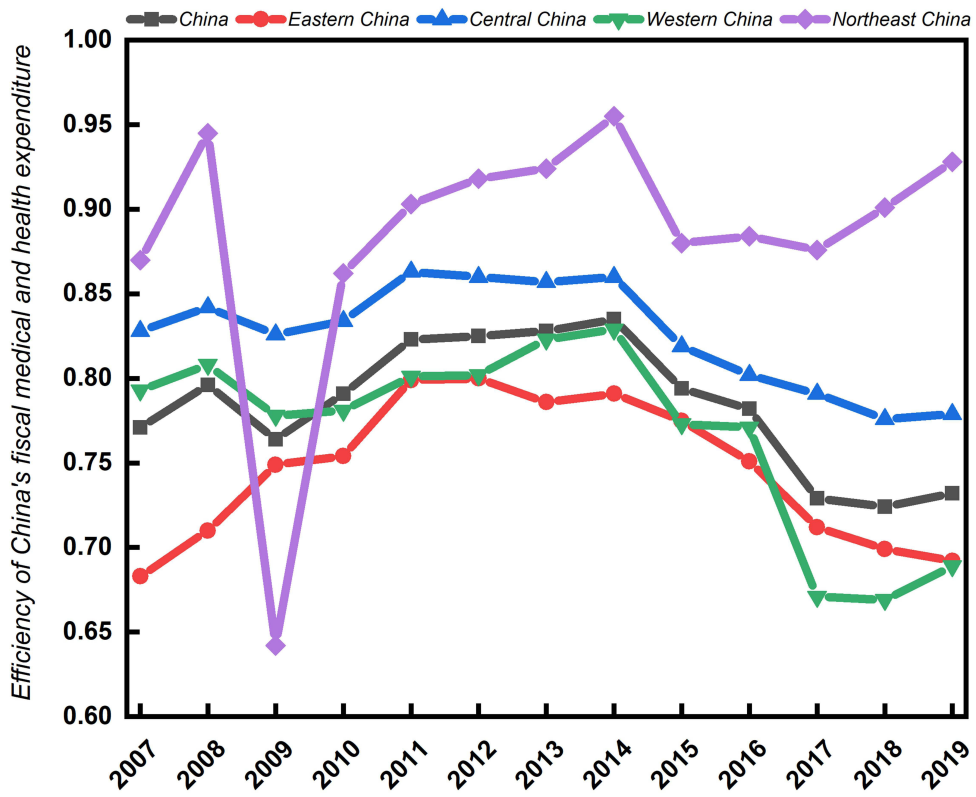

Figure 1 Efficiency trend of China's fiscal medical and health expenditure from 2007 to 2019.
Notes: The left ordinate represents the expenditure efficiency of China's fiscal health expenditure.

decreased from 0.22 to 0.148, a reduction of 33%, and the central area decreased from 0.147 to 0.093, a decrease of 37%. The western part decreased from 0.173 to 0.102, a reduction of 41%. Northeast China dropped from 0.142 to 0.062, a decrease of 56%. It shows that the gap between China's per capita fiscal medical and health expenditure is gradually narrowing. Especially after the decision of the CPC Central Committee on several significant issues of building a socialist harmonious society in 2006. They proposed to form progressively an essential public service system benefiting the whole people; therefore, the fairness of China's fiscal medical and health expenditure has been significantly improved.

Table 9 Fairness of China's Fiscal Medical and Health Expenditure from 2007 to 2019

Time	China	Eastern China	Central China	Western China	Northeast China
2007	0.176	0.220	0.147	0.173	0.142
2008	0.155	0.200	0.112	0.154	0.135
2009	0.141	0.188	0.111	0.133	0.116
2010	0.133	0.172	0.097	0.135	0.108
2011	0.114	0.156	0.082	0.108	0.099
2012	0.115	0.155	0.093	0.109	0.084
2013	0.115	0.158	0.090	0.109	0.082
2014	0.107	0.140	0.088	0.105	0.077
2015	0.104	0.141	0.091	0.096	0.071
2016	0.109	0.150	0.091	0.101	0.075
2017	0.106	0.150	0.082	0.099	0.073
2018	0.106	0.151	0.079	0.099	0.072
2019	0.108	0.148	0.093	0.102	0.062

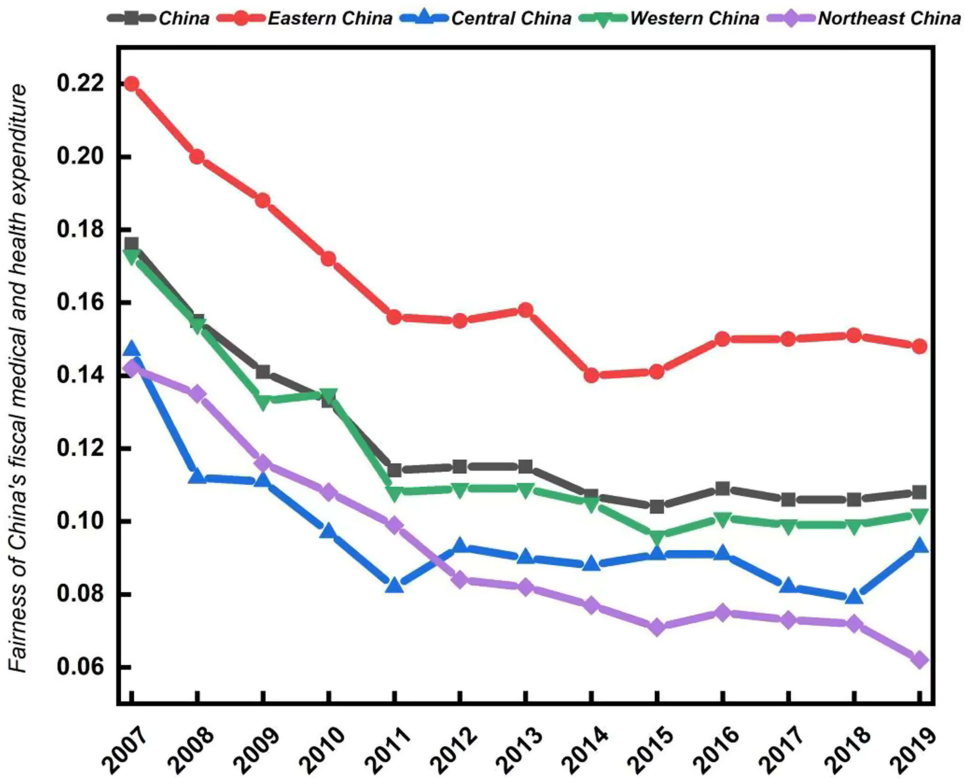

Figure 2 Fairness trend of China's fiscal medical and health expenditure from 2007 to 2019.
Notes:The left ordinate represents the fairness of China's fiscal health expenditure.

Discussion

Before we start the discussion, we should make some explanations. Our assessment results are limited to the efficiency level of government input and output and the regional fairness of the information and do not involve social benefits and other issues. Based on this premise, we assume that we will discuss and analyze further. First, China's total fiscal expenditure on medical and health care is still insufficient, with significant room for improvement. Especially in the context of the increasing aging of the population, constantly improving the total level of medical and health expenditure is an inevitable measure to meet the growing needs of the people. Second, the government does not pay enough attention to medical and health care, which needs further strengthening. Especially under the long-term impact of COVID-19 in the future, the government should continue to pay more attention to the medical and health care field. Third, the overall efficiency of expenditure results is low, with significant differences among regions. The expenditure efficiency of the eastern region is lower than that of the central, western, and northeast regions. This result is consistent with the results of previous studies. The specific reasons are as follows: due to the western development, the rise of the central region, and the implementation of the Northeast Revitalization Strategy, the health resources, and management of the central, western, and northeast regions have been improved, which is higher than the expenditure efficiency of the eastern region. At the same time, due to the developed economy, the eastern region attracts more foreign populations, which leads to the crowding of medical resources. Finally, it leads to a decline in expenditure efficiency. Fourth, expenditure efficiency showed an upward trend from 2007 to 2014 and a downward trend from 2014 to 2019. This phenomenon may be because the state relaxed the restrictions on private capital entering the medical and health field in 2013. However, due to the imperfect system and supporting policies, public hospitals decreased significantly, and private hospitals increased significantly. At the same time, due to the problems of lagging service and low-scale efficiency of private hospitals, the overall resource allocation ability decreased. Fifth, the overall fairness of expenditure results is good and shows a downward trend, but it is the same as expenditure efficiency in terms of regional differences. The fairness of expenditure in the eastern region is lower than that in the

central, western, and northeast regions. Because of the western development, the central area's rise, and the implementation of the Northeast Revitalization Strategy have improved and balanced the finance of the central, western, and northeast regions, which is higher than the expenditure fairness of the eastern region. As the eastern region is relatively developed, there is no central policy support. However, the economic development level of each area in the eastern region is not the same, so the fiscal resources of each local government are not consistent, and the internal gap is large, so the expenditure fairness of the eastern region is low. Based on the above, this paper puts forward the following policy suggestions:

Increase Medical and Health Investment and Enhance the Relative Attention of the Government

Although the economic pressure caused by COVID-19 is relatively severe, the government should realize that continuously focusing on attention and increasing the investment in medical and health care can alleviate the impact of COVID-19. Therefore, we can improve people's confidence fundamentally, enhance the economy's reasonable expectations, and finally achieve economic recovery. Changing the government's expenditure structure and increasing the government's investment and relative attention can effectively reduce the negative social impact caused by the epidemic, alleviate people's anxiety, and enhance people's trust in the government. In addition, the government should play a fund-raising role. The government should promote the cooperation between the government and social capital through flexible use of "PPP", medical bonds, preferential policies, interest subsidies, and other means. The government promotes the continuous development of the medical and health field by driving more social funds into the medical and health field to satisfy the growing medical and health needs of the people.

Improve the Expenditure Performance Appraisal System

The feedback mechanism of performance appraisal is not perfect, and performance results do not play a substantial role in allocating government funds. Therefore, firstly, the government should strengthen the construction of the performance appraisal system and improve the operability of performance appraisal. Secondly, the government should improve the accountability mechanism and incorporate performance appraisal results into cadre appraisal. Thirdly, the government should consummate the social think tank system and strengthen the supervision of third-party forces. Fourthly, the government should improve the performance appraisal information management system. By supporting the real-time performance results and feedback, the performance fund can be timely and accurate supervision and management.

Regional Issues Cannot Be Cut Across the Board

According to this study, we can find that there are significant differences between regions in China. Therefore, when formulating relevant policies, each area should study the corresponding countermeasures according to its conditions and conditions. Based on the analysis of the self situation, learn from the excellent experience at home and abroad, improve the problems existing in expenditure efficiency and expenditure fairness, realize regional coordinated development, and improve China's medical and health service level.

Conclusion

The overall level of fiscal medical and health expenditure in China shows an upward trend, but there is still much room for improvement. At the same time, there are pronounced regional differences, and the problems of efficiency and fairness coexist among regions. Therefore, in the future, we should increase medical and health investment and enhance the government's close attention. Continue to improve the fiscal decentralization and transfer systems; Improve the expenditure performance appraisal system; Formulate policies according to local conditions and avoid "one size fits all."

Data Sharing Statement

The data supporting the findings of this study are available from the Census and Statistics Department of the Ministry of Public Health in China, the China National Bureau of Statistics, and the Ministry of Finance of the people's Republic of China.

Ethics Approval and Consent to Participate

The study was exempt from the need to obtain approval (deidentifid data, not human subjects).

Author Contributions

All authors made a significant contribution to the work reported, whether in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas, took part in drafting, revising, or critically reviewing the article, gave final approval to the version to be published, have agreed on the journal to which the article has been submitted, and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests.

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