Evaluation of the Efficiency of Provincial Medical and Health Services in China from 2012 to 2021

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Abstract. To explore the change trend and influencing factors of health service efficiency in China from 2012 to 2021, and provide scientific basis for rational allocation of health resources in the next step. Methods: We selected medical and health institutions in 31 provinces and cities of China as the research objects. We used BCC model, Malmquist index model and fixed effect model to analyze the service efficiency of health institutions in 31 provinces and cities, based on the data from China Health Statistical Yearbook and China Statistical Yearbook from 2013 to 2022. We applied DEAP 2.1 software for DEA model empirical analysis and Stata15.1 for regression analysis. Conclusion: The efficiency of health resource allocation in China was improving continuously with a good development trend, but it was not good overall. Most provinces had invalid DEA and decreasing returns to scale, and the corresponding input did not get the expected output. The regional development was unbalanced, and there was a large difference in health service efficiency among provinces. This paper provided scientific basis for rational allocation of health resources in China in the next step, and put forward corresponding policy suggestions.

Keywords: Data envelopment analysis · Malmquist index · health service efficiency · Fixed-effect model

1 Introduction

With the all-round development of society, people's health awareness and needs are increasing [1]. As a superpower with a large population, China faces a major challenge of how to allocate medical resources efficiently and equitably, which is directly related to people's health and property security, as well as a key issue for government decision-makers. The report of the 20th National Congress of the CPC proposes to "promote the expansion of high-quality medical resources and the balanced distribution of medical resources in different regions", which shows the government's determination to solve this problem. After covid-19, it is worth discussing how efficient China's health service is and what weak links need to be improved.

The efficiency of public medical service is an important issue that affects the quality and accessibility of health care in China. Domestic scholars have also carried out some

N. Akhtar et al. (Eds.): PMIS 2023, AHIS 8, pp. 666–678, 2023.
https://doi.org/10.2991/978-94-6463-200-2_69

researches on this topic, mainly focusing on measuring the static efficiency and dynamic efficiency of public medical service in various medical institutions at all levels. However, most of these studies are based on a single model or a single region, which may not reflect the overall situation and trend of public medical service efficiency in China. Zhang Xin An et al. (2017) [2] calculated the health resource allocation efficiency of TCM hospitals in China based on DEA and found that there was a significant regional difference and room for improvement. Zhao Darren et al. (2018) [3] based on the DEA CCR and BCC model to estimate the technical efficiency, pure technical efficiency and scale efficiency of Sichuan Province Hospital Medical Service and suggested that hospitals should optimize their scale and structure to enhance their performance. Chen Yang et al. (2021) [4] based on DEA-Malmquist Index, calculated the Health Resource Allocation efficiency of TCM hospitals in China from 2013 to 2018 and analyzed the factors affecting the efficiency change. Yue et al. (2021) [5] used DEA-Malmquist index model to study the dynamic change of public medical service efficiency of county-level TCM hospitals in Hubei Province from 2015 to 2017 and revealed that technological progress was the main driving force for efficiency improvement. Wang and Tao (2021) [6] used the Malmquist index to assess trends in public health service efficiency in 31 provinces of our country and identified some key influencing factors such as population aging, urbanization and income level. These studies have provided valuable insights into the measurement and evaluation of public medical service efficiency, but they also have some limitations such as data availability, model selection and regional representativeness. Therefore, there are few studies on the combination of Malmquist and fixed-effect model to measure the efficiency of health services, so this study is innovative. Based on the BCC model in DEA, this study evaluates the health service efficiency of 31 provinces and cities by combining the Malmquist index and the fixed effect model, which can improve the accuracy and robustness of estimation results, reducing the bias caused by environmental factors, playing an important role in promoting the optimal allocation of health resources, reducing the health inequality among regions.

2 Study Design

2.1 Selection of Index System

This study refers to the existing literature, combined with research objectives and data availability, selects the number of health institutions and beds as material input indicators, the number of health technicians as human input indicators, and bed occupancy rate, number of discharges and number of visits as output indicators. The internal factors include daily number of physicians, daily number of beds and average length of stay4. The external factors are GDP per capita and government health expenditure. See Table 1 for the selection of indicators.

2.2 Model Selection

2.2.1 BCC-Malmquist Model

DEA is a method proposed by United States operational research scientist Chames et al. to evaluate the relative efficiency of similar decision-making units (DMU) and

Table 1. Indicator selection description

Indicator Type	Indicator Name	Indicator Description
Input index	Number of health institutions (number)	Total number of medical institutions
	Number of beds (pcs)	Total number of beds owned by medical institutions
	Number of health technicians (number)	Total number of health technicians in medical institutions
Output index	Bed utilization rate (%)	Bed utilization rate of medical institutions
	Number of patients admitted (unit)	Total number of hospital admissions in medical institutions
	Diagnosis and treatment person-times (person-times)	The total number of visits per year by the medical institution
internal influence factor index	The average number of doctor's visits per day (person-times)	Average daily workload of doctors
	Daily hospital bed days (bed days)	Average daily inpatient workload of physicians
	Average length of stay (days)	Average length of stay in hospital
Indicators of external influencing factors	Per capita GDP (10,000 yuan)	GNP per capita
	Government expenditure on health (10,000 yuan)	Financial allocations for health undertakings

evaluate their input-output effectiveness, including CCR model, BCC model, ST model and Malmquist model, etc. [7]. At present, this method is widely used in the medical and health field. In DEA, BCC model adjusts the assumption of constant returns to scale in CCR model, assumes that returns to scale are variable, decomposes comprehensive efficiency into the product of pure technical efficiency and scale efficiency, and obtains returns to scale and relative efficiency among decision-making units. Malmquist index method is widely used to measure productivity change [8].

2.2.2 Panel Fixed Effect Model

This study establishes a panel econometric model to analyze the impact of various factors on the overall efficiency. Random effects model needs to assume that explanatory variables are independent of individual effects, which is difficult to hold in reality, so this paper finally chooses fixed effects model. Further, the joint significance test of the year dummy variable showed that it was necessary to control the time effect, so this paper finally chose the two-way fixed effect model controlling individual and time. This study selects panel data from 2012 to 2021 to establish a model:

$$\begin{aligned}\ln CE_{it} = \alpha_0 + \alpha_1 \ln NOP_{\mathrm{it}} + \alpha_2 \ln HD_{it} + \alpha_3 \ln DIPD_{\mathrm{it}} + \\ \alpha_4 \ln AVGDP_{it} + \alpha_5 \ln GEH_{it} + \eta_t + \delta_t + \varepsilon_{it}\end{aligned} \tag{1}$$

In Eq. (1), the explained variable CE represents the comprehensive efficiency value of health institution services, and the explanatory variables include the number of daily person-times of diagnosis and treatment undertaken by doctors (NOP), the average length of stay (HD), the daily length of hospital bed undertaken by doctors (DIPD), the GDP per capita (AVGDP) and the government health expenditure (GEH), η_t and δ_t respectively represent the time fixed effect and individual fixed effect, and ε_{it} represents the random disturbance term.

In order to ensure that the model does not exist multicollinearity problem, this paper calculates the variance inflation factor VIF between explanatory variables, and finds that the VIF values between variables are all less than 3, indicating that the model does not exist serious multicollinearity problem.

2.3 Data Source

The data of this study are from China Health Statistics Yearbook and China Statistical Yearbook from 2013 to 2022, and 31 provinces and cities except Taiwan, Hong Kong Special Administrative Region and Macao Special Administrative Region are selected as the research objects.

3 Empirical Analysis

3.1 Static Efficiency

Analysis in this study, with the help of output-oriented BCC model and DEAP2.1 software, the comprehensive efficiency analysis of medical institutions in 31 provinces and cities in China from 2012 to 2021 is calculated, and the results are shown in Table 2. 2012–2021 In 2001, only Zhejiang Province and Shanghai City had a comprehensive efficiency value equal to 1.The number (proportion) of provinces with comprehensive efficiency value less than 1 in each year is 25(81%), 18 (58%), 18 (58%), 20 (65%), 20 (65%), 18 (58%), 18 (58%), 19(61%), 21 (68%) and 21(68%) respectively. The average comprehensive efficiency over the years is 0.826, 0.904, 0.905, 0.910, 0.914, 0.921, 0.921, 0.917, 0.874, 0.874 respectively. The comprehensive efficiency of Liaoning, Shandong, Shanxi, Jilin, Heilongjiang, Inner Mongolia, Shaanxi and other places over the years is lower than the national average. From the above data, it can be concluded that there is still much room for improvement in the service efficiency of health institutions in most provinces and cities in China, which is at a medium level as a whole, with great regional differences.

Figure 1 and Fig. 2 show the pure technical efficiency and scale efficiency of medical institutions in 31 provinces and cities in China in 2012 and 2021.It can be seen from the figure that most provinces and cities in China have not reached the pure technical efficiency and effectiveness, so it is necessary to improve the management level and medical

Table 2. Comprehensive Efficiency of Medical Services by Province from 2012 to 2021

Province	Year											
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Mean value	Standard deviation
Beijing	0.911	0.961	0.912	0.938	0.988	0.945	0.979	1.000	0.922	1.000	0.956	0.033
Tianjin	1.000	1.000	0.992	0.988	0.993	0.978	1.000	1.000	1.000	1.000	0.995	0.007
Hebei	0.780	0.864	0.951	0.965	0.920	0.912	0.878	0.945	0.799	0.744	0.876	0.074
Liaoning	0.696	0.692	0.663	0.675	0.677	0.690	0.670	0.616	0.567	0.580	0.653	0.045
Shanghai	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000
Jiangsu	0.892	0.966	1.000	1.000	1.000	1.000	0.973	0.977	0.942	0.879	0.963	0.043
Zhejiang	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000
Fujian	0.867	0.902	0.868	0.884	0.891	0.895	0.897	0.991	0.848	0.847	0.889	0.039
Shandong	0.746	0.810	0.872	0.893	0.900	0.897	0.883	0.902	0.847	0.857	0.861	0.047
Guangdong	0.983	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.952	0.956	0.989	0.018
Hainan	0.930	1.000	1.000	1.000	0.986	1.000	1.000	1.000	1.000	0.932	0.985	0.027
Shanxi	0.525	0.557	0.560	0.568	0.605	0.635	0.672	0.627	0.603	0.619	0.597	0.042
Jilin	0.682	0.653	0.674	0.683	0.692	0.720	0.705	0.682	0.576	0.658	0.673	0.037
Heilongjiang	0.710	0.750	0.735	0.758	0.794	0.769	0.717	0.714	0.485	0.571	0.700	0.092
Anhui	0.897	1.000	1.000	1.000	1.000	1.000	0.974	0.923	0.921	0.863	0.958	0.049
Jiangsu	0.742	1.000	1.000	1.000	1.000	1.000	1.000	0.980	0.926	0.911	0.956	0.078
Henan	0.741	0.825	0.935	0.958	0.947	0.950	0.946	0.970	0.921	0.799	0.899	0.076
Hubei	0.790	0.966	0.977	0.984	1.000	1.000	0.998	0.962	0.822	0.910	0.941	0.072
Hunan	0.679	0.924	0.938	0.930	0.945	0.961	0.953	0.963	0.958	0.957	0.921	0.082
Chongqing	0.734	1.000	0.996	0.997	0.985	0.992	0.952	0.937	0.936	0.956	0.949	0.075
Inner Mongolia	0.615	0.637	0.611	0.620	0.647	0.678	0.702	0.659	0.608	0.624	0.640	0.030
Sichuan	0.768	0.955	0.868	0.880	0.892	0.914	0.893	0.915	0.875	0.888	0.885	0.046
Guizhou	0.733	1.000	0.999	0.930	0.913	0.943	1.000	0.985	0.990	0.953	0.945	0.077
Yunnan	0.982	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.005
Guangxi	0.792	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.979	0.062
Xizang	1.000	1.000	1.000	1.000	0.921	1.000	1.000	1.000	1.000	1.000	0.992	0.024
Shanxi	0.475	0.707	0.731	0.769	0.792	0.838	0.868	0.823	0.754	0.777	0.753	0.104
Gansu	1.000	0.889	0.774	0.813	0.863	0.876	0.888	0.848	0.838	0.808	0.860	0.059
Ningxia	1.000	1.000	1.000	0.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.001
Qinghai	0.944	0.995	1.000	0.984	0.977	0.956	1.000	1.000	1.000	1.000	0.986	0.020
Xinjiang	0.993	0.958	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.995	0.013

technology level to achieve the purpose of improving the pure technical efficiency. From the perspective of scale efficiency, there is a common phenomenon of irrational scale in China, and the return to scale is in a decreasing state, which indicates that the low

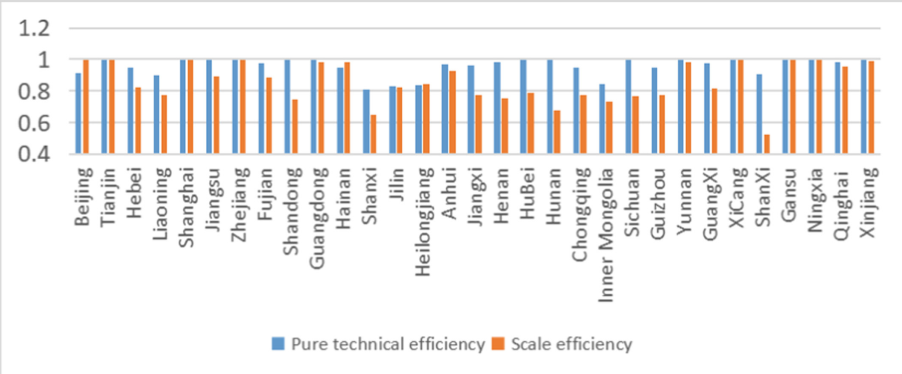

Fig. 1. Pure technical efficiency and scale efficiency of 31 provinces and cities in 2012

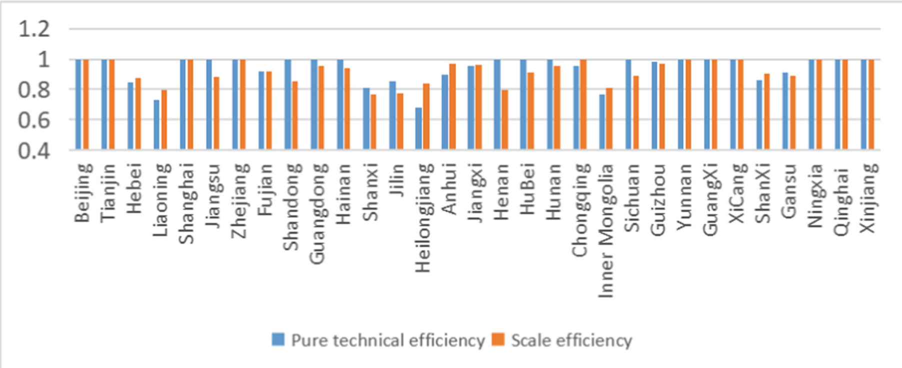

Fig. 2. Pure technical efficiency and scale efficiency of 31 provinces and cities in 2021

overall efficiency is not caused by insufficient investment, so some medical institutions need to optimize the scale in order to achieve the rational allocation of resources.

3.2 Dynamic Efficiency Analysis

From the annual average change analysis (see Table 3), the technical efficiency change index of 31 provinces and cities in our country has increased by 0.7%, the technical progress index has increased by 3%, the pure technical efficiency change index has decreased by 0.2%, the change in scale efficiency index rose 0.9% and the Total factor productivity index rose 3.7%. In terms of year-on-year changes, the technical efficiency change index rose the most in 2012–2013, by 10%, and fell the most in 2019–2020, by 5.4%. The technology progress index rose the most in 2013–2014, by 49.6%, and declined the most in 2019–2020, by 11.7%. The change in net technical efficiency index rose by 1% in the 2020–20212021 and fell by 2.8% in the 2019–2020 period. The scale efficiency change index rose the most in 2012–2013, by 0.7%, and declined the most in

Table 3. Malmquist index of health resource allocation efficiency in China from 2012 to 2021

Changes in technical efficiency index	Technical progress index	Pure technical efficiency change index	Scale efficiency change index	Total factor productivity index
1.100	1.104	1.007	1.092	1.215
1.001	1.496	1.004	0.997	1.498
1.007	0.943	0.999	1.008	0.95
1.009	0.997	1.001	1.008	1.005
1.006	0.987	1.001	1.006	0.993
1.000	0.978	0.996	1.003	0.978
0.993	0.990	0.991	1.002	0.983
0.946	0.883	0.972	0.973	0.835
1.004	0.994	1.010	0.994	0.998
1.007	1.03	0.998	1.009	1.037

2019–2020, by 2.7%. The Total factor productivity index rose the most in 2012–13, by 21.5%, and fell the most in 2019–2020, by 16.5%.

From Table 4, we can see that in 2012–2021, the 2021 Index of Tianjin, Shanghai, Hainan, Tibet, Ningxia and other six provinces and cities (19%) was less than one, while the Total factor productivity index of other provinces and cities (19%) was less than one, the other 25 provinces and cities (81%) all have TFP indices greater than 1, indicating that the medical resource allocation efficiency of most provinces and cities in our country is constantly improving and the development trend is good. There are 7 provinces and cities (64%) with TFP index greater than 1 in the eastern region, and 8 provinces and cities (100%) with TFP index greater than 1 in the central region, there are 10 provinces and cities (83%) with TFP index greater than 1 in the western region, which shows that the central region is superior to the eastern and western regions in improving the efficiency of medical resource allocation. Of the four decomposition indices of the Total factor productivity index of healthcare resource allocation, progress in technology is the largest, and similar to the Total Factor Productivity Index. From the four decomposition indices of the total factor production index, the average change indices of technical efficiency in the Eastern, central and western parts of our country are 0.999, 1.009 and 1.012 respectively, with Shaanxi Rising by 5.6%, Heilongjiang fell 2.4%. The technical progress index averaged 1.017, 1.05 and 1.029, with Yunnan up 7.8% and Tibet down 5.9%. The net technical efficiency change index averaged 0.998, 0.997 and 0.999, with Beijing up 1% and Heilongjiang down 2.3%. The mean change indices of scale efficiency were 1.002, 1.013 and 1.014, respectively, with Shaanxi rising by 6.3% and Gansu falling by 1.3%. The Total factor productivity index averaged 1.016, 1.059 and 1.042, with Guizhou up 8.6%and Tibet down 5.9%.

Table 4. Malmquist index of health resource allocation efficiency in China's provinces and cities from 2012 to 2021

Province	Changes in technical efficiency index	Technical progress index	Pure technical efficiency change index	Scale efficiency change index	Total factor productivity index
Eastern region					
Beijing	1.010	0.984	1.010	1.000	0.994
Tianjin	1.000	0.974	1.000	1.000	0.974
Hebei	0.995	1.041	0.988	1.007	1.035
Liaobing	0.980	1.047	0.977	1.003	1.026
Shanghai	1.000	0.996	1.000	1.000	0.996
Jiangsu	0.998	1.051	1.000	0.998	1.049
Zhejiang	1.000	1.026	1.000	1.000	1.026
Fujian	0.997	1.027	0.993	1.004	1.025
Shandong	1.016	1.040	1.000	1.016	1.057
Guangdong	0.997	1.016	1.000	0.997	1.013
Hainan	1.000	0.986	1.005	0.995	0.986
Mean value	0.999	1.017	0.998	1.002	1.016
Central region					
Shanxi	1.018	1.028	1.000	1.019	1.047
Jilin	0.996	1.045	1.003	0.993	1.040
Heilongjiang	0.976	1.052	0.977	0.999	1.027
Anhui	0.996	1.077	0.991	1.004	1.073
Jiangsu	1.023	1.043	0.999	1.024	1.067
Henan	1.008	1.050	1.002	1.007	1.058
Hubei	1.016	1.062	1.000	1.016	1.079
Hunan	1.039	1.044	1.000	1.039	1.084
Mean value	1.009	1.050	0.997	1.013	1.059
Western region					
Chongqing	1.030	1.047	1.001	1.028	1.078
Inner Mongolia	1.002	1.030	0.990	1.012	1.032
Sichuan	1.016	1.049	1.000	1.016	1.066
Guizhou	1.030	1.055	1.004	1.026	1.086
Yunnan	1.002	1.078	1.000	1.002	1.080

(*continued*)

Table 4. (*continued*)

Province	Changes in technical efficiency index	Technical progress index	Pure technical efficiency change index	Scale efficiency change index	Total factor productivity index
Guangxi	1.026	1.045	1.003	1.023	1.072
Xizang	1.000	0.941	1.000	1.000	0.941
Shanxi	1.056	1.026	0.994	1.063	1.084
Gansu	0.977	1.024	0.989	0.987	1.000
Ningxia	1.000	0.987	1.000	1.000	0.987
Qinghai	1.006	1.000	1.002	1.005	1.007
Xinjiang	1.001	1.068	1.000	1.001	1.069
Mean value	1.012	1.029	0.999	1.014	1.042
Mean value	1.007	1.030	0.998	1.009	1.037

3.3 Analysis of Influencing Factors

In this study, Stata15.1 software was used to perform regression analysis on the constructed panel fixed effect model, and the regression results are shown in Table 5. The explanatory variables of model (1) include only internal factors, model (2) includes external factors, and model (3) includes only external factors.

From the perspective of internal factors, in model (1) and model (2), the regression coefficients of lnNOP and lnDIPD are both positive and significant, which indicates that the number of doctors 'daily diagnosis and treatment and the number of hospital beds per day have a positive impact on the overall efficiency of medical services. The regression coefficient of lnHD is negative and significant, indicating that the average length of stay has a negative impact on the overall efficiency of medical services, and the overall efficiency of medical services can be improved by appropriately reducing the average length of stay.

From the perspective of external factors, the regression coefficient of lnAVGDP is positive and significant in the regression results of model (2) and model (3), which indicates that economic development can effectively promote the improvement of comprehensive efficiency of medical services; The regression coefficient of lnGEH is negative and significant, which indicates that although the government has increased the investment in health, it has not been used reasonably, thus achieving the purpose of improving the comprehensive efficiency of medical services, which is consistent with the conclusion that the health resources have not been allocated reasonably from the static analysis results.

Table 5. Regression result analysis

	Explained variable: comprehensive service efficiency of medical institutions		
	Model (1)	Model (2)	Model (3)
lnNOP	0.6135*** (0.2184)	0.7328*** (0.1746)	-
lnHD	−1.4216*** (0.4813)	−1.5147*** (0.4153)	-
lnDIPD	0.6762*** (0.3416)	0.6285*** (0.2531)	-
lnAVGDP	-	0.4953** (0.3426)	0.5824*** (0.4826)
lnGEH	-	−0.5062*** (0.3124)	−0.3936*** (0.2003)
Constant term	1.3007 (1.2013)	−1.4325 (1.7046)	−0.6952 (1.2041)
obs	240	240	240
R2	0.4016	0.4153	0.4821
F	13.64	11.82	14.25

4 Conclusions and Suggestions

4.1 Conclusion

(1) From the results of static analysis, it can be concluded that the efficiency of health services in most provinces and cities in China still has a large room for improvement, which is at a medium level as a whole, with large regional differences. According to the diminishing returns to scale of most provinces and cities, it can be found that the main reason for the low efficiency of health services in China is the lack of output indicators, that is, under the current investment of health resources. Due to the low level of management and redundancy of personnel in medical institutions, their capacity has not been maximized, resulting in certain waste. From the perspective of time span, except that the total factor productivity index in 2012–2013, 2013–2014 and 2015–2016 was greater than 1, the total factor productivity index in other years was all less than 1, and the overall total factor productivity index was in a decreasing state, indicating that the growth rate of China's health resource allocation efficiency slowed down in recent years.

(2) It can be seen from Table 4 that from 2012 to 2021, the average value of the total factor productivity index of health resource allocation in eastern, central and western China was 1.016, 1.059 and 1.042 respectively. Among them, the total factor productivity in the central region increased the most, with an average growth rate of 5.9%, followed by the western region (4.2%) and the eastern region (1.6%).There are differences in the allocation efficiency of health resources across China, which is consistent with the research results of Xia Wenqi et al.[9].The technical progress index of the eastern, central and western regions is greater than 1, which indicates that the technology of health resource allocation in China is constantly improving, and technological progress drives the positive growth of total factor productivity. From the average

annual growth of Malmquist index, we can see that there are still provinces with negative growth at this stage, and the gap between provinces is relatively large.

(3) From the Malmquist index and its decomposed geometric mean, the total factor of production index is 1.037, the technical progress index (1.03) > the technical efficiency change index (1.007), and because the former is obtained by multiplying the latter two, it can be concluded that the improvement of health service efficiency in China in recent years is mainly driven by new technologies, which is consistent with the research results of Wu Jingjing [10] and other researchers, That is to say, the growth of health service efficiency in China is technology-oriented, and the empirical results show that the internal influencing factors can significantly affect health service efficiency.

4.2 Recommendations

(1) Improve the management level of medical institutions to avoid ineffective investment. According to conclusion 1, we can know that most provinces of our country scale returns decline, the main reason for the low efficiency of health services in our country is the lack of output indicators, that is, under the investment of health resources at the present stage, because of the low level of management and the redundancy of personnel in the medical institutions, the state should strengthen the management of the medical institutions under the condition of limited health resources and constantly optimize the operation model, strengthen the training of health technical personnel, and constantly improve the overall quality of health workers, so as to maximize the efficiency of health services to truly serve the people.

(2) Promoting regional equalization of medical resources. From conclusion 2, we can draw the conclusion that the technology of health resource allocation in China is improving, but the gap between provinces is also relatively large. Therefore, it is necessary to optimize and improve the input and output of non-effective areas, and maximize the equalization of health resource allocation among provinces and cities [11]. The efficiency of resource allocation is generally high in the eastern region, but it also shows an unbalanced situation in the region, with some regions having insufficient output, such as the diminishing returns to scale in Fujian province, it shows that the output quantity corresponding to the input quantity is not reached in this area. Therefore, the demand and allocation of health resources should be re-examined, the allocation of health resources should be scientifically planned, and the existing resources should be reasonably deployed in the province to maximize the output.

(3) Introduce scientific and technological talents and use modern information technology to improve the efficiency of health services. From conclusion 3, it can be concluded that the continuous development and innovation of science and technology have promoted the improvement of our country's health service efficiency, provinces and cities should pay attention to the impact of technological progress on improving total factor productivity. In the future, the advantages of Internet and other technologies in hospital management, patient service and improvement of medical service quality should be brought into play. Through the introduction of scientific

and technological talents, we can combine medical treatment with science and technology more quickly, accelerate the transformation of scientific and technological achievements, and improve the efficiency of health service more quickly.

Acknowledgment. Supported by the Humanities and Social Sciences Research Project of the Ministry of Education (15YJCZH124).

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