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博士の専攻分野の名称：博士（保健科学）

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Analysis of Chinese Healthcare Resources Allocation's Equality

(中国の医療資源配分の平等性に関する研究)

Chapter 1 :

The equality of healthcare resource allocation is considered an essential issue worldwide, especially for developing countries such as China. China, with a large population, has a broad landscape. It has always been facing whether there are enough medical services to meet the needs of people and whether people can access healthcare services equally. This study tried to reveal that gradually by horizontal and vertical comparison. For the horizontal side, the medical equality level of 31 Chinese provinces was assessed and compared to find the inequality areas; that of Chinese rural and urban regions was evaluated and compared to find the gap between the two areas. The Chinese government has been promoting the level of medical accessibility. This study aims to show the changes in medical services over ten years, which is the vertical direction. It was presented whether the medical reforms make the healthcare services developed.

Chapter 2 :

The Healthcare Resource Density Index (HRDI) was used to evaluate equity in the demographic and geographical dimensions. Data were extracted from the Chinese Statistical Yearbook (2010-2019). The requirement values related to the ratio of doctors, nurses, and institution beds per thousand people were drawn from government documents. The data of healthcare serviceability indicators was compared with those requirements to check the situation of each province's medical development. Based on the results, from 2010 to 2018, there was a sustainable upward trend in government investment. However, a noticeable drop in investment in northeast areas was seen. Although the HRDI of the institutions, beds, doctors, and nurses experienced some small fluctuations over the years, the developing areas in the middle-west areas had almost approached the level of developed east regions. The unequal distribution of healthcare services in China was unfair between the eastern and mid-western regions.

Chapter 3 :

The Theil index can assess the general equality in China or divided segments. The Theil index method considers the population factor but not the land factor. In this study, population and land were viewed as factors; therefore, the formula of the Theil index was modified by adding the land factor to assess the inequality of healthcare resources. For the sum of the government investment and the number of healthcare institutions and beds, the value of the Theil index was close to the x-axis under 0.03 from 2010 to 2019. All indicators were negative below the

x-axis for the new formula results and remained stable. This study used the traditional Theil index to evaluate the inequality in healthcare resources. This shows that the inequality situation in China was excellent after the two deep reforms. Apart from the institutional inequality between the group, other factors of inequality stemmed from within the group.

Chapter 4:

Data envelopment analysis (DEA) is a tool for measuring the efficiency and productivity of decision-making units (DMUs) to envelop observed input-output vectors. Using the data envelopment analysis (DEA) method, scale efficiency, technological efficiency, and so on were considered in the model. Moreover, the Malmquist Productivity Index (MPI) was introduced to evaluate annual changes in efficiency. A significant increase was evident in the three types of efficiency from 2010 to 2019. The situation regarding constant efficiency was significant for the western and eastern areas. The efficiency of the two areas was approximately 0.9, which is close to 1, indicating excellent efficiency. The Malmquist Index's efficiency changes from 2011 to 2016 were greater than or equal to 1. For technical change, for the first ten years except for the third year, all values were greater than 1. The western and central areas improved efficiency in China after implementing medical reforms. Noteworthy is that the management of Chinese healthcare institutions was always excellent.

Chapter 5:

Data envelopment analysis (DEA) is a valuable and appropriate way to estimate hospital efficiency. The variable returns to scale (VRS) efficiency measurement model allows the breakdown of efficiency into technical and scale efficiencies in DEA. Decision Making Unit (DMU) is flexibly any such entity, with each entity to be evaluated as part of a collection that utilises similar inputs to produce identical outputs. This study extracted 31 provinces' data for analysis. the ratio of efficient regions to total eastern provinces was 58% greater than that of the middle sections (56%). For the countryside, efficient and the inefficient regions occupied approximately half of all, respectively. Output slack means there is space for enhancing output. Six provinces can increase one of the outputs. Beijing had the most enormous slack value, 11.43 in inpatient output. During China's development and medical reforms, hospitals' performance has been outstanding as more than half of provinces' hospitals reached efficiency. The efficiency gaps within the eastern area were significant and should be paid more attention.

Chapter 6:

The Chinese medical reforms were effective but could not solve all the problems. There is still a gap between distinct areas, which need to be considered, and reforms and medical systems should be improved to meet the needs of people. This study learned the equality of healthcare resource allocation in China and offered plenty of evidence for policymakers to strengthen equality in the future. China was trying to narrow the economic situation between two areas and received the effect, but for the medical service, the government must pay more attention. There are some merits in this study. First, it modified the formula of the Theil Index. The traditional formula considered the population as a parameter for countries with broad landscapes. This study put the land area into the Theil Index as a parameter, making people learn about the situation. Second, this study considered the efficiency of institutions as an indicator of equality level. To be efficient, institutions can make the medical system equal. The redundant medical resources could be invested in the areas with a shortage of healthcare resources.