Research on health care integration policy evaluation based on grounded theory and PMC index model

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Abstract. Health care integration is an important way to achieve healthy ageing and meet the personalized health care needs of the elderly. Based on 16 policies on health care integration introduced at the national level in China from 2013 to 2022, the open coding process of grounded theory was used to set up variable indicators and construct a PMC index model for quantitative evaluation of the policies. The results of the study show that the mean value of the PMC index of 16 policies is 7.42, including 12 excellent policies and 4 good policies. Through the PMC curve and depression index, it is found that the overall quality of the combined medical care and support policy in China is good, but it still needs further optimization and improvement in terms of policy timeliness, policy tools, policy operability and policy innovation.

1 Introduction

By the end of 2021, the total number of the elderly people aged 60 and above in China was 267 million, accounting for 18.9% of the total population, which increased by 3.29 million compared with 2020 [1], and the aging level of the population will be transferred from a relatively slow evolution state to a rapidly growing "fast track". In order to alleviate the contradiction between the multi-level health care demand of the elderly and the supply of medical resources [2], China has explored the mode of combining medical care with old-age care, which combines elderly care and medical resources, and integrates life care and rehabilitation care, and this is a rational choice for China to actively cope with the ageing population. The development of the combination of health care integration is inseparable from the guidance and support of government policies. Since 2013, the central government has promulgated a series of policies on the combination of medical and nursing care, and the number of policy documents has gradually increased, but there are still problems such as poor policy connection, insufficient systematization and weak policy implementation [3]. Therefore, this study through the quantitative analysis of medical care combined with policy text, combined with policy evaluation results put forward the existing problems of health care integration policy and related suggestions, in order to provide a theoretical basis and reference for the improvement and optimization of health care integration policies.

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2 Review of research

The literature on the study of China's health care integration policy can be divided into the following two main categories: the first is the evaluation of the scientific rationality of policy content formulation, and the second is the evaluation of the effectiveness of policy implementation. Compared with the second category, the literature in the first category is richer. Namely, most scholars have focused their research on the evaluation of the content of the policy of health care integration.

At present, the policy and practice of health care integration in China are still in the stage of exploration and development, and there are many sectors involved in medical and nursing care, so there are obvious differences in the content and focus of relevant policies. Sun Juanjuan [4] used content analysis to sort out and analyse China's health care integration policies, pointed out that the current policy formulation pays less attention to the non-disabled elderly and proposing the construction of a systematic health care integration policy. Zhao Xiaofang [5] used three types of policy tools, namely supply-based, demand-based and environment-based, to evaluate health care integration policies, and pointed out that the current policy formulation shows an imbalance between environment-based and demand-based tools (demand-based only accounts for 15.2%) and put forward countermeasures and suggestions for this.

In terms of evaluating the effectiveness of policy implementation, Wang Lili [6] outlined four stages in the development of China's health care integration policy system and proposed countermeasures for the problems existing in the current stage of policy implementation. Chen Zhipeng [7], on the other hand, based on the Smith model, analysed the execution of health care integration policy from four aspects: policy itself, executive subject, target group and implementation environment.

In summary, most of the existing studies focus on the evaluation of health care integration policies from the perspective of policy tools, with insufficient targeting of policy evaluation indicators and lack of reference to policy chronology, etc. Therefore, this paper makes use of the open coding process of grounded theory to conceptualise and categorise the policy content. Through repeated comparisons and in-depth analysis of the text content, to search for the key policy information contained in health care integration policy, in order to identify more comprehensive and reliable evaluation indicators and quantitatively analyse the policy content from different dimensions by constructing a PMC index model, and propose improvement suggestions for the problems of the health care integration policy.

3 Research methodology and data sources

3.1 Research methodology

Grounded theory is a research method combines quantitative and qualitative proposed by Glaser and Strauss, which has the advantage of transforming the policy text content into a quantitative and visible form of expression, and the main research steps can be divided into open coding, spindle coding and selective coding [3].

The PMC index model is a policy measurement model proposed by Ruiz Estrada [8] based on the idea of Omnia Mobilis hypothesis, which can analyse the consistency of policies from multiple dimensions to find their strengths and weaknesses, and visualize the policy dimensions through PMC surface diagrams. In recent years the PMC index model has been widely used in quantitative research on policies such as the digital economy, civil-military integration and advanced manufacturing industry, and has become a more advanced and mature method for evaluating policy content internationally. The steps are as follows: (1)

Classification of variables and parameters (2) Construction of multi-input-output tables (3) Measurement of PMC index (4) Mapping of PMC surface.

3.2 Sources of policy sample

This paper collects relevant policy documents by using the "pkulaw" search system and visiting the official websites of the State Council and various ministries and commissions, using the keywords "integration of health care" and " combination of medical care and support ". In order to improve the accuracy and representativeness of the policies, the criteria for selecting sample policies are as follows: (1) completeness, policy types are higher-level documents such as plans, regulations and opinions, and some informal policy texts such as letters, replies and approvals are removed; (2) authority, the policy issuing bodies are mainly the State Council and ministries; (3) relevance, the selected policy contents are closely related to the combination of health care. After a systematic study of the policy texts, a total of 16 policy documents on health care integration from 2013 to 2022 were selected as the research samples in this paper.

4 PMC index model construction

4.1 Extraction of key elements of the policy

In order to avoid the inaccuracy of manual subjective assignment, this paper conceptualizes and categorizes 16 collected health care integration policies using grounded theory analysis method, and further refined the concepts with the same or similar meanings in the policy texts into categories to obtain the open coding category results [3]. Due to space limitations, only some of the results are shown, as seen in Table 1.

Table 1. Open coding (part).

Number	Original Policy Texts	Concept	Category
Policy 1	Vigorously developing a network of home care services	Establish a service network	Policy objective
Policy 1	Encourage social forces to set up standardized and chain elderly care institutions	Social capital participation	Focused tasks
Policy 1	Vigorous development of rural mutual care services	Rural elderly services	
Policy 1	Encourage and guide financial guarantee institutions to support the development of the health service industry	Investment and finance assistance	Incentive measures
Policy 1	Non-profit medical and nursing institutions may adopt the allocation method to give priority to guaranteeing land use	Land supply	
Policy 1	Develop safe and effective rehabilitation aids, food and drugs and other service products for the elderly	Age-friendly product development	Policy innovation
……	……	…….	……
Policy 16	……	…….	……

4.2 PMC indicators system

Based on Estrada's [8] policy evaluation study, 10 primary variables and 40 secondary variables were set according to the existing variable setting criteria of scholars such as Liu

Jida [3], Fang Yongheng [9], Zhang li [10] and combined with the open category results, as shown in Table 2.

Table 2. PMC index variable settings.

First variable	secondary variable	Sources
Policy nature X1	X1:1 prediction, X1:2 advice, X1:3 regulation, X1:4 support, X1:5 guidance	Estrada[8]
Policy Innovation X2	X2:1 age-friendly product development, X2:2 information platform development, X2:3 emerging industry integration	Fang Yongheng[9]
Policy timeliness X3	X3:1 long term(>5 years), X3:2 medium term(3-5 years), X3:3 short term(<3 years)	Zhang li[10]
Policy tools X4	X4:1 supply-based, X4:2 environment-based, X4:3 demand-based	Fang Yongheng[9]
Policy objective X5	X5:1 improve service levels, X5:2 expand service field, X5:3 build service systems, X5:4 strengthen service management, X5:5 optimize development environment, X5:6 establish service networks	Text mining
Focused tasks X6	X6:1 integration of health care, X6:2 informatization development, X6:3 social capital participation, X6:4 diversified collaboration mechanism, X6:5 rural elderly care services, X6:6 construction of service facilities, X6:7 development of industry standards, X6:8 elderly industry clusters	Text mining
Policy operability X7	X7:1 refine policy initiative, X7:2 clarify division of tasks	Estrada[8]
Incentive measures X8	X8:1 tax discount, X8:2 land supply, X8:3 investment and financing assistance, X8:4 talent training, X8:5 pilot demonstration, X8:6 included in the designated scope of medical insurance	Liu Jida[3]
Policy evaluation X9	X9:1 well founded, X9:2 well planned, X9:3 scientifically programmed, X9:4 clearly targeted	Zhang li[10]
Policy disclosure X10		

4.3 Constructing multi-input-output tables

After setting up the primary and secondary variables, the text mining method is used to assign values to each secondary variable and construct a multi-input-output table for text analysis, in which each second level variable is given the same weight, and the variable took the value of 1 when the policy to be evaluated meet the content of the corresponding secondary variable, otherwise the value is 0.

4.4 Calculation of PMC index

According to the research method of Ruiz Estrada [8], the calculation of the PMC index consists of the following steps: the first step puts the primary and secondary variables into a multi-input-output table; the second step assigns values to the secondary variables according to equation (1) and equation (2); the third step calculates the values of the primary variables according to equation (3); the fourth step calculates the PMC index according to equation (4).

$$X \sim N[0,1] \tag{1}$$

$$X = \{XR: [0 \sim 1]\} \tag{2}$$

$$X_i = \left[\sum_{j=1}^{n} \frac{X_{ij}}{T(X_{ij})}\right] \quad t = 1,2,3,4 \ldots . \tag{3}$$

In equation (3), “t” is a primary variable and “j” is a secondary variable.

$$PMC = \begin{bmatrix} X_1\left(\sum_{i=1}^{5}\frac{X_{1i}}{5}\right)+X_2\left(\sum_{i=1}^{3}\frac{X_{2i}}{3}\right)+X_3\left(\sum_{i=1}^{3}\frac{X_{3i}}{3}\right)+ \\ X_4\left(\sum_{i=1}^{3}\frac{X_{4i}}{23}\right)+X_5\left(\sum_{i=1}^{6}\frac{X_{5i}}{6}\right)+X_6\left(\sum_{i=1}^{8}\frac{X_{6i}}{8}\right)+ \\ X_7\left(\sum_{i=1}^{2}\frac{X_{7i}}{2}\right)+X_8\left(\sum_{i=1}^{6}\frac{X_{8i}}{6}\right)+X_9\left(\sum_{i=1}^{4}\frac{X_{9i}}{4}\right)+X_{10} \end{bmatrix} \quad (4)$$

Since there are 10 primary indicators selected in this paper, the calculated PMC index takes values between 0 and 10. Referring to the evaluation criteria of Ruiz Estrada [8], evaluation levels are set: PMC index of 9 to 10 is perfect policy; 7 to 8.99 is excellent policy; 5 to 6.99 is good policy; 0 to 4.99 is bad policy.

Based on the above formulas, this paper scores each of the 16 health care integration policies, calculates the PMC index of each policy and classifies them into grades, with specific information shown in Table 3 (All policy disclosure X10 scores are 1).

Table 3. PMC Index of health care integration policy.

	X1	X2	X3	X4	X5	X6	X7	X8	X9	PMC Index	Level
P1	1.00	0.67	0.33	0.67	0.83	0.88	0.50	0.83	1.00	7.71	Excellent
P2	0.60	0.33	0.67	1.00	0.50	0.50	0.50	0.50	1.00	6.60	Good
P3	0.60	0.67	0.67	0.67	0.83	0.63	0.50	0.67	1.00	7.23	Excellent
P4	1.00	0.67	0.67	1.00	0.67	0.50	0.50	0.83	1.00	7.83	Excellent
P5	0.60	0.67	0.67	0.67	0.67	0.63	1.00	1.00	1.00	7.89	Excellent
P6	0.60	0.67	0.33	0.67	0.67	0.63	0.50	0.67	1.00	6.73	Good
P7	0.60	0.67	0.33	0.67	0.83	0.63	0.50	0.67	1.00	6.89	Good
P8	0.80	1.00	0.33	1.00	0.83	0.63	0.50	1.00	1.00	8.09	Excellent
P9	0.60	0.67	0.33	1.00	0.67	0.63	1.00	0.83	1.00	7.73	Excellent
P10	0.60	0.67	0.33	1.00	0.50	0.75	1.00	0.83	1.00	7.68	Excellent
P11	0.60	0.67	0.33	0.67	0.67	0.63	1.00	0.67	1.00	7.23	Excellent
P12	0.60	1.00	0.33	0.67	0.67	0.50	0.50	0.67	1.00	6.93	Good
P13	1.00	1.00	0.67	0.67	0.67	0.88	0.50	0.83	1.00	8.21	Excellent
P14	0.80	0.67	0.33	0.67	0.83	0.63	1.00	0.67	1.00	7.59	Excellent
P15	0.60	0.33	0.33	1.00	0.83	0.75	0.50	0.83	1.00	7.18	Excellent
P16	0.60	0.67	0.33	0.67	0.50	0.50	1.00	1.00	1.00	7.27	Excellent
Mean	0.70	0.69	0.44	0.79	0.70	0.64	0.69	0.78	1.00	7.42	—

4.5 Constructing PMC surface

In order to show the score of each policy more clearly and intuitively, this paper constructs a PMC surface diagram and use visual approach to visualize the strengths and weaknesses of each policy. Since the policy in the primary variable is policy disclosure X10, there is no secondary variable and each policy is equally scored as 1. Therefore, X10 is removed to satisfy the symmetry of the matrix, and a 3*3 matrix is constructed according to equation (5) and the PMC surface diagram of each policy is drawn.

$$PMC = \begin{bmatrix} X_1 & X_2 & X_3 \\ X_4 & X_5 & X_6 \\ X_7 & X_8 & X_9 \end{bmatrix} \quad (5)$$

5 Results of PMC index model analysis

5.1 Overall policy evaluation

The analysis results shows that the health care integration policies meet expectations and are relatively well designed overall. The mean value of the PMC index for the 16 selected policies is 7.42, including 12 excellent rated policies and 4 good rated policies. As seen in Table 3, the PMC indices of 16 policies are, from highest to lowest, P13, P8, P5, P4, P9, P1, P10, P14, P16, P11, P3, P15, P12, P7, P6 and P2.

By comparing the difference between the scores of each level variable and the overall mean, the advantages and disadvantages of the policies can be evaluated at a macro level. The high scores for Policy nature X1(0.70), Policy objective X5(0.70) and Incentive measures X8(0.78) indicate that the sample policies basically include different policy natures such as advice, regulation, support, prediction and guidance, and policy objectives are clearer and more reasonable. Policy tools X4(0.79) shows a certain degree of structural imbalance in the use of policy tools, with a lack of demand-based instruments. However, the scores of Policy timeliness X3(0.44), policy innovation X2(0.69), Policy operability X7(0.69) and Focused tasks X6(0.64) are relatively low, indicating that the timeliness of most of the policies in the sample is mainly medium-and short-term and the policy innovation and synergy are insufficient. The specific division of labour among different departments is not clear, and the focus of policies is not comprehensive enough to support the development of rural age care services and elderly industry clusters is low.

5.2 Analysis of specific policies

Due to the large sample of policies, in order to better demonstrate the differences scores between the various health care integration policies through the PMC index model, only the policy P13 with the highest PMC index score and P2 with the lowest are listed in this paper to plot the PMC surface diagram and perform systematic analysis, as shown in Figure 1.

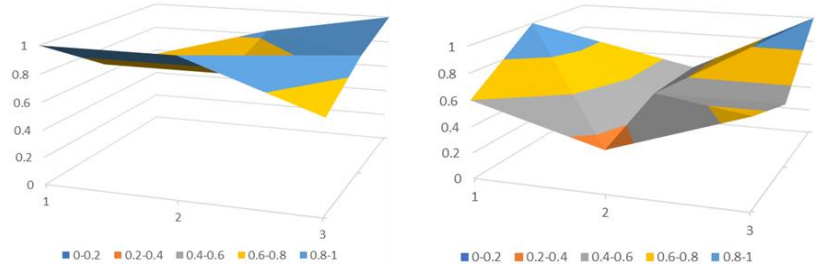

Fig. 1. PMC surfaces diagram for P13 (left) and P2 (right).

The depression index is inversely proportional to the PMC index, that is, the higher the score on the PMC index, the shallower the degree of depression shown by the policy in the radar chart. In order to make the comparison of policies clearer, this paper constructs a cobweb diagram with the specific scores of P13 and P12 (see Figure 2), from which it can be seen that P2 is more depressed than P13, while the smaller depression indicates that the policy quality is better. The policy P13 scored significantly higher than P2 in the field of policy nature, policy objectives, focused tasks, incentive measures and policy innovation, but P2 is better in policy tools and policy timeliness, which shows that P2 is more comprehensive in the use of policy instruments and clearer in the phased goal planning. In terms of policy operability, however, the scores of the two policies are low, which suggest that both P13 and P2 lack a clear division of tasks.

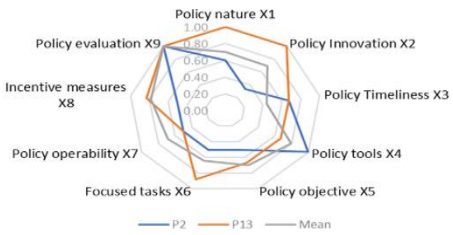

Fig. 2. Policy comparison cobweb diagram.

Specifically, P13 has a PMC index of 8.21, with a grade rating of excellent, and is ranked first among the 16 policies. The policy has 5 primary variables scored above the overall mean, but slightly below in terms of policy timeliness, policy tools and policy operability. The policy objective is relatively clear, but there is no mention of a sound service network. Focused tasks cover information development, social capital participation, rural old-age care services, industry standard formulation and other aspects, but the development of an elderly care industry cluster is missing. The inclusion of health insurance fixed-point coverage is lacking in incentive measures. Policy nature and policy innovation are fully covered. Policy tools include supply-based and environment-based instruments, but demand-based tools are missing and the government purchase services, external contracting and others are not mentioned. The policy needs to be further optimized in terms of the use of policy tools and operability, and the suggested optimization path for this policy is X4-X7.

The PMC index for P2 is 6.60, which is rated Good and ranked last among 16 policies. The policy is only above the overall average in terms of Policy timeliness and policy tools, while five first-level variables score significantly below the average. Policy tools are relatively comprehensive, including supply-based, environmental-based and demand-based. The policy timeliness is mainly short- and medium-term, but lack a long-term planning. There is a lack of supervision on the development of the integration of health care is insufficient, and the guidance force on the future development and direction is weak. Informatization development, rural old-age care services, industry standards formulation, and elderly industry clusters are not mentioned in the focused tasks, so the contents are not comprehensive enough. Incentive measures include tax concessions, land supply, investment and financing assistance and talent training, but there is a lack of pilot demonstration and included in the designated scope of medical insurance. The policies are not innovative enough, with less emphasis on the development of age-friendly products and information platform construction. The optimization path for this policy is X1-X2-X5-X6-X7-X8.

6 Suggestions

Based on the results of the PMC index, the following recommendations are put forward:

First, optimise the use of policy tools to achieve structural balance. Various policy tools should be used in an integrated manner, giving full play to the inherent advantages and mechanisms of action of different policy tools and optimising the structure of policy tools.

Second, improve the supervision and administration mechanism to enhance the operability of policies. Collaboration among various departments should be strengthened, and we shall clarify the scope of authority and responsibility of each department, establish a dedicated agency for unified management to break the situation of multi-head government management and promote the effective articulation between policies. At the same time, supervisory mechanisms and evaluation mechanisms should be introduced, and use collaborative institutional tools to guarantee the implementation of policies on the integration of health care [2], reduce deviations in the process of policy implementation, and enhance the connectivity of the external system of health care integration.

Third, encourage innovative policy development and improve the policy system. Vigorously support the integration of healthcare integration with education, Chinese medicine, Internet+ and other industries [6], and gradually realise the agglomeration and development of the health elderly care industry. Guiding the sinking of medical resources, enhancing the accessibility of rural elderly services and promoting the optimal allocation of health and elderly resources by improving the hierarchical medical and treatment system and the two-way referral system. We shall improve the medical insurance system, increase the designated coverage rate of medical insurance in medical and nursing institutions, and reduce the burden of medical service costs for the elderly.

Fourth, strengthen top-level design and reasonably formulation policy objectives. Most policies are based on short- and medium-term planning, with a relatively short time limit for policies and mostly fragmented, and the predictability and guiding role of policies need to be improved. It should pay more attention to the long-term planning for health care integration, reasonably set phased objectives and give full play to the foresight of policy formulation, and enhance the long-term effectiveness and stability of policies. At the same time, the policy content should be continuously strengthened and enriched to reduce the arbitrariness and one-sidedness of policy design [9] to achieve a precise matching between supply and demand.

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