

General Practice / Community Health Service Research

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Abstract

Background Village doctors, as the health “guardians” of rural residents, are an important force in building the rural medical and health service system. **Objective** To review and scientifically evaluate China’s policies on village doctors since the deepening of the medical and health system reform, and to provide a reference for promoting the high-quality development of the village doctor workforce. **Methods** From October 2023 to July 2024, this study used social network analysis and the policy modeling consistency (PMC) index model to construct an evaluation index system for China’s village doctor policies since the deepening of the medical and health system reform, including 9 primary variables and 40 secondary variables. Subsequently, an empirical analysis was conducted on 10 selected policy samples to be evaluated, the PMC index was calculated, PMC surfaces and mean radar charts were drawn, and a quantitative evaluation and analysis of China’s village doctor policies were performed. **Results** Among the 10 policy samples to be evaluated, the overall evaluation of policy effectiveness was good, with 9 rated as good and 1 as excellent. Driven by the contexts of Healthy China, rural revitalization, and health poverty alleviation, the specificity of policies related to the construction of the village doctor workforce has steadily improved. However, shortcomings remain, including insufficiently comprehensive policy content coverage, relatively independent policy-issuing bodies, and overly concentrated levels of effectiveness, and policy consistency still needs to be strengthened. **Conclusion** In the future, comprehensive measures should be taken to optimize the combination of policy instruments, address shortcomings in infrastructure development, strengthen legislative safeguards, and enhance cross-departmental coordination, so as to promote the high-quality development of the village doctor workforce. The limitation of this study is that the samples focus only on core policies at the national level, and the comprehensiveness of the samples may therefore be limited.

Full Text

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Research on Quantitative Evaluation of China’s Rural Doctor Policies Based on the PMC Index Model

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[Abstract] Background Rural doctors, as the health “guardians” of rural residents, are an important force in building the rural medical and healthcare system. **Objective** To systematically review and scientifically evaluate China’s rural doctor policies since the deepening of the medical and healthcare system reform, and to provide references for promoting the high-quality development of the rural doctor workforce. **Methods** From October 2023 to July 2024, this study used social network analysis and the policy modeling consistency (PMC) index model to construct an evaluation index system for China’s rural doctor policies since the deepening of the medical and healthcare system reform. The system included 9 primary variables and 40 secondary variables. Empirical analysis was then conducted on 10 selected policy samples to be evaluated; the PMC index was calculated, PMC surfaces and mean radar charts were plotted, and a quantitative evaluation and analysis of China’s rural doctor policies was performed. **Results** Among the 10 policy samples to be evaluated, the overall evaluation of policy effectiveness was good, with 9 rated as good and 1 as excellent. Driven by the contexts of Healthy China, rural revitalization, and health poverty alleviation, the targeting of policies related to the construction of the rural doctor workforce has steadily improved. However, shortcomings remain, including insufficiently comprehensive policy content coverage, relatively independent policy-issuing bodies, and overly concentrated effectiveness levels; policy consistency still needs to be strengthened. **Conclusion** In the future, comprehensive measures should be taken in such areas as optimizing the combination of policy tools, addressing shortcomings in infrastructure construction, strengthening legislative safeguards, and enhancing cross-departmental coordination, so as to promote the high-quality development of the rural doctor workforce. The limitation of this study is that the samples focus only on core policies at the national level, and the comprehensiveness of the sample may therefore be limited.

[Keywords] health policy; rural doctors; primary medical and healthcare system; PMC index model; quantitative policy evaluation

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[Abstract] Background As the health “guardians” of rural residents, rural doctors play a crucial role in the development of the rural healthcare system. **Objective** This study aims to systematically review and scientifically evaluate China’s rural doctor policies since the healthcare system reform, providing references for promoting the high-quality development of the rural doctor workforce. **Methods** From October 2023 to July 2024, this study employed social network analysis and the PMC index model to construct an evaluation index system for China’s rural doctor policies since the deepening of healthcare system reform. The system comprises nine primary variables and 40 secondary variables. Subsequently, empirical analysis was conducted on ten selected policy samples for evaluation, calculating the PMC index, plotting PMC surfaces, and creating mean radar charts. This enabled a quantitative evaluation and analysis of China’s rural doctor policies. **Results** In the evaluation of

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ten policy samples, the overall effectiveness was rated positively, with nine items assessed as good and one as excellent. Driven by the Healthy China Strategy, rural revitalization, and targeted poverty alleviation in healthcare, the relevance of policies concerning the development of rural healthcare teams has steadily improved. However, several shortcomings persist, including incomplete cover-

age of policy content, relatively independent policy-issuing agencies, and an excessive concentration of effectiveness levels. Additionally, the consistency of policies requires further enhancement. **Conclusion** The rural doctor policy should be optimized by improving the combination of policy tools, addressing infrastructure deficiencies, strengthening legislative safeguards, and enhancing inter-departmental coordination, so as to promote the high-quality development of the rural doctor workforce.

[Key words] Health policy; Rural doctors; Primary health care system; PMC index model; Quantitative evaluation of policies

Rural doctors are not only an important component of the rural healthcare safety net, but also an important force in building the rural medical and health service system. The stability and healthy development of this workforce are closely related to the vital interests of the vast number of farmers. A sound rural medical and health service system is key to consolidating the achievements of health-based poverty alleviation, and strengthening the construction of the rural primary healthcare system is an intrinsic requirement of the rural revitalization strategy. Since the deepening of medical and health system reform, China has successively issued a number of policies to support the development of the rural doctor workforce. However, the workforce still faces problems such as personnel shortages, unclear responsibilities, lack of pension protection, relatively low educational attainment, and weak professional competence[1-2]. This may be related to factors such as inadequate alignment between some policy objectives and supporting measures, as well as insufficient comprehensiveness of some policy content. In view of this, this study introduces the Policy Modeling Consistency (PMC) index model into research on rural doctor policies. The advantages of using the PMC index model to evaluate policies are as follows. First, by comparing the level and composition of PMC indices, it can intuitively reflect the strengths and weaknesses within the rural doctor policy system[3], and objectively analyze the internal consistency and completeness of policies from multiple dimensions. Second, the PMC surface chart can visually display each indicator of the policy and its overall performance, while the radar chart can provide a comprehensive evaluation of the policy. This study uses the PMC index model to construct an index evaluation framework specifically for assessing China's rural doctor policies since the deepening of medical and health system reform. Through scoring, it enables policymakers and analysts to intuitively understand the internal structure and external effects of policies[4], with the aim of providing reference for relevant government departments to improve rural doctor policies and formulate related policies, thereby promoting the high-quality development of China's rural doctor workforce.

1 Data Sources and Inclusion/Exclusion Criteria

1.1 Data Sources

From October 2023 to July 2024, using “rural doctors” as the search keyword, policy texts related to rural doctor policies were selected as the research objects from publicly released policy documents on platforms such as the National Health Commission, the Chinese government website, and the PKULaw database. The retrieval period was 2009-03-17 to 2024-05-17.

1.2 Inclusion and Exclusion Criteria

Inclusion criteria: (1) rural doctor policy documents issued at the national level, i.e., documents issued by the State Council and its directly affiliated institutions; (2) policy content directly related to rural doctors; (3) policy types mainly including plans, outlines, opinions, notices, and other documents that directly reflect government intentions.

Exclusion criteria: (1) policy texts with weak relevance to rural doctor policies or duplicates; (2) abolished/revised documents, circulars, and report-forwarding documents; (3) documents that could not be obtained. A total of 60 rural doctor policies were obtained.

2 Construction of the PMC Index Model for Rural Doctor Policies

The PMC index model construction method is an important approach for evaluating the content effectiveness and influence of policy texts. To overcome the subjectivity and ambiguity of traditional policy effectiveness evaluation, ESTRADA proposed the policy consistency index model to measure policy effectiveness. By constructing a multi-input-output table, it objectively analyzes the internal consistency of a given policy across multiple dimensions[5]. This paper constructs a PMC index model for analyzing the effectiveness of rural doctor policies. Through the PMC index and the degree of concavity and convexity of the surface, the strengths and shortcomings of each policy can be directly reflected.

Generally speaking, the PMC index model includes the following four necessary steps[5-6] (Figure 1): (1) collection and preprocessing of policy texts; (2) construction of a multi-input-output table; (3) calculation of the PMC index; (4) drawing of the PMC surface chart. According to the grading criteria for PMC index policies, they can be divided into four consistency levels[5]. When the PMC index is in the interval $[0, 4)$, it indicates that the policy is a low-consistency policy and is defined as failing; when the PMC index is in the interval $[4, 6)$, it is an acceptable-consistency policy and is defined as passing; when the PMC index is in the interval $[6, 8)$, it is a relatively good-consistency policy and is defined as good; when the PMC index is in the interval $[8, 9)$, it is a perfect-consistency policy and is defined as excellent[7-9]. It should be noted that the

higher the PMC index, the better the consistency before and after the policy text within the policy modeling evaluation system, the stronger the completeness of the policy, and the greater the policy effectiveness[3]. In addition, in the PMC index model, the more indicators whose scores are lower than the mean, the more obvious the deficiencies in the aspect represented by that indicator for the policy under evaluation, and the more attention should be paid to them.

2.1 Policy Text Collection and Preprocessing

To ensure that variables at all levels in the construction of the indicator system could cover all key points of the policy texts, keywords such as “rural doctors / village doctors / village clinics” were searched within the 60 policies, yielding a total of 245 policy text analysis units and forming a database. The policy text database was imported into ROSTCM 6.0 software for social network and semantic network analysis and text mining, extracting terms that appeared with relatively high frequency in the policy content and reflected the key concerns of rural doctor policies.

node terms, thereby forming a word-frequency co-occurrence network diagram (Figure 2). On the basis of the distribution of high-frequency policy terms and keywords, the content of the 60 policy texts, and relevant policy research findings, the sub-variable indicators were determined[7,10-12] (Table 1).

2.2 Construction of the Evaluation Indicator System for Rural Doctor Policy

By integrating ESTRADA’ s variable foundation and existing research findings[7-9,12-16], and by analyzing these in light of the content characteristics of rural doctor policies[17-18], an evaluation system for rural doctor policy was constructed. Nine main variables and 40 sub-variables were identified, as shown in Table 1.

2.3 Construction of the Multi-Input-Output Table

The multi-input-output table is the data-analysis framework used to calculate the PMC index for rural doctor policy. Based on the nine main variables in Table 1, each main variable contains several sub-variables, and equal weights are assigned to the sub-variables. The variables are processed in binary form: when a policy satisfies the condition of a variable, the value is set to 1; otherwise, it is set to 0 (Table 2).

3 Empirical Study

3.1 Selection of Policy Samples to Be Evaluated

First, to ensure the scientific soundness and completeness of the PMC evaluation indicator system, 60 policies were screened, yielding a total of 245 policy-text

analysis units strongly related to the construction of the rural doctor workforce, in order to determine the sub-variable indicators. Second, for the sample policies, comprehensive consideration was given to the content structure of the policy samples[19], the scientific comparability of the evaluation results[20], and the representativeness and comprehensiveness of the sample policies. According to the number of documents issued in the four policy periods, and following a ratio of 1:3:2:4, 10 rural-doctor policies with comprehensive coverage and high relevance were ultimately selected.

Figure 1. Steps to build a PMC index model

Text appearing in Figure 1: Policy text collection; variable selection and parameter identification; policy text collection and preprocessing; indicator-system construction; construction of the multi-input-output table; PMC index calculation; PMC surface-plot drawing.

Figure 2. Word-frequency co-occurrence network diagram for rural doctor policy

Text appearing in Figure 2: performance; traditional Chinese medicine; special plan; education; practicing (assistant) physician; administrative department; universities and colleges; graduates; training; remuneration; township health center; infrastructure construction; essential medicines system; general practitioner; service capacity; county area; rural areas; medical and health care; system; primary level; informatization; mechanism; innovation; public health; funding; talent cultivation; government; subsidy; compensation; elderly care; health; organizational leadership; institutions; planning; rural doctor; village clinic; assessment.

Table 1 Quantitative evaluation indicator system and variable-setting table for rural doctors' policies

Main variable	Sub-variable	Sub-variable parameter setting (yes = 1, no = 0)	Indicator source
X1: Policy nature	X1: 1 Prediction	Whether this policy has a predictive nature	From Ruiz et al. [13]
X1: Policy nature	X1: 2 Recommendation	Whether this policy has a recommendatory nature	From Ruiz et al. [13]
X1: Policy nature	X1: 3 Feedback	Whether this policy has a feedback-oriented nature	From Ruiz et al. [13]

Main variable	Sub-variable	Sub-variable parameter setting (yes = 1, no = 0)	Indicator source
X1: Policy nature	X1: 4 Supervision	Whether this policy has a supervisory nature	From Ruiz et al. ^[13]
X1: Policy nature	X1: 5 Description	Whether this policy has a descriptive nature	From Ruiz et al. ^[13]
X1: Policy nature	X1: 6 Guidance	Whether this policy has a guiding nature	From Ruiz et al. ^[13]
X2: Policy timeliness	X2: 1 Long term	Whether the impact of this policy lasts more than five years	From Zhang Yong' an et al. ^[14]
X2: Policy timeliness	X2: 2 Medium term	Whether the impact of this policy lasts three to five years	From Zhang Yong' an et al. ^[14]
X2: Policy timeliness	X2: 3 Short term	Whether the impact of this policy lasts within three years	From Zhang Yong' an et al. ^[14]
X3: Policy perspective	X3: 1 Macro	Whether this policy involves a macro perspective	From Hu Yangming et al. ^[7]
X3: Policy perspective	X3: 2 Meso	Whether this policy involves a meso perspective	From Hu Yangming et al. ^[7]
X3: Policy perspective	X3: 3 Micro	Whether this policy involves a micro perspective	From Hu Yangming et al. ^[7]
X4: Policy content	X4: 1 Infrastructure construction	Whether this policy involves infrastructure construction	Social-network and semantic-network analysis; text mining

Main variable	Sub-variable	Sub-variable parameter setting (yes = 1, no = 0)	Indicator source
X4: Policy content	X4: 2 Talent education and training	Whether this policy involves talent education and training	Social-network and semantic-network analysis; text mining
X4: Policy content	X4: 3 Pension security	Whether this policy involves pension security	Social-network and semantic-network analysis; text mining
X4: Policy content	X4: 4 Financial subsidies	Whether this policy involves financial subsidies	Social-network and semantic-network analysis; text mining
X4: Policy content	X4: 5 Institutional development	Whether this policy involves institutional development	Social-network and semantic-network analysis; text mining
X4: Policy content	X4: 6 Benefits improvement	Whether this policy involves benefits improvement	Social-network and semantic-network analysis; text mining
X4: Policy content	X4: 7 Supervision and management	Whether this policy involves supervision and management	Social-network and semantic-network analysis; text mining
X5: Policy tools	X5: 1 Supply type	Whether this policy involves supply-type policy tools	From Song Dacheng et al. [15]
X5: Policy tools	X5: 2 Demand type	Whether this policy involves demand-type policy tools	From Song Dacheng et al. [15]
X5: Policy tools	X5: 3 Environment type	Whether this policy involves environment-type policy tools	From Song Dacheng et al. [15]

Main variable	Sub-variable	Sub-variable parameter setting (yes = 1, no = 0)	Indicator source
X6: Policy evaluation	X6: 1 Sufficient basis	Whether the basis for formulating this policy is sufficient	From Hu Xinli et al. ^[8]
X6: Policy evaluation	X6: 2 Clear objectives	Whether the objectives for formulating this policy are clear	From Hu Xinli et al. ^[8]
X6: Policy evaluation	X6: 3 Detailed planning	Whether the planning for formulating this policy is detailed and practical	From Hu Xinli et al. ^[8]
X6: Policy evaluation	X6: 4 Scientific plan	Whether the plan for formulating this policy is scientific	From Hu Xinli et al. ^[8]
X7: Level of effectiveness	X7: 1 Laws and regulations	Whether the effectiveness of this policy reaches the level of laws and regulations	From Xue Huiyuan et al. ^[12]
X7: Level of effectiveness	X7: 2 Administrative regulations	Whether the effectiveness of this policy reaches the level of administrative regulations	From Xue Huiyuan et al. ^[12]
X7: Level of effectiveness	X7: 3 Departmental rules	Whether the effectiveness of this policy reaches the level of departmental rules	From Xue Huiyuan et al. ^[12]
X7: Level of effectiveness	X7: 4 Normative documents	Whether the effectiveness of this policy reaches the level of normative documents	From Xue Huiyuan et al. ^[12]

Main variable	Sub-variable	Sub-variable parameter setting (yes = 1, no = 0)	Indicator source
X7: Level of effectiveness	X7: 5 Industry regulations	Whether the effectiveness of this policy reaches the level of industry regulations	From Xue Huiyuan et al. ^[12]
X8: Issuing agency	X8: 1 CPC Central Committee and its General Office	Whether this policy was issued by the CPC Central Committee and its General Office	From Xue et al. ^[9] and Zhang Yong' an et al. ^[16]
X8: Issuing agency	X8: 2 State Council and its General Office	Whether this policy was issued by the State Council and its General Office	From Xue et al. ^[9] and Zhang Yong' an et al. ^[16]
X8: Issuing agency	X8: 3 National ministries and commissions	Whether this policy was issued by national ministries and commissions	From Xue et al. ^[9] and Zhang Yong' an et al. ^[16]
X8: Issuing agency	X8: 4 Other agencies or departments	Whether this policy was issued by other agencies or departments	From Xue et al. ^[9] and Zhang Yong' an et al. ^[16]
X9: Policy target	X9: 1 Rural doctors	Whether the target of this policy involves rural doctors	Social-network and semantic-network analysis; text mining
X9: Policy target	X9: 2 Township health centers	Whether the target of this policy involves township health centers	Social-network and semantic-network analysis; text mining
X9: Policy target	X9: 3 Village clinics	Whether the target of this policy involves village clinics	Social-network and semantic-network analysis; text mining

Main variable	Sub-variable	Sub-variable parameter setting (yes = 1, no = 0)	Indicator source
X9: Policy target	X9: 4 Institutions of higher education / medical schools	Whether the target of this policy involves institutions of higher education / medical schools	Social-network and semantic-network analysis; text mining
X9: Policy target	X9: 5 Medical graduates	Whether the target of this policy involves medical graduates	Social-network and semantic-network analysis; text mining

Empirical research was conducted on the sample policies concerning doctors.

Regarding the division of the four policy periods: the system-construction period (2009–2010) focused on establishing a more complete rural medical-service system. The deepening and consolidation period (2011–2015) aimed to consolidate previous achievements and deepen reform. The period of stable integration (2016–2020) focused on other fields, with the development of rural medical care incorporated into broader health and social-development strategies. The high-quality development period (2021 to the present) places greater emphasis on improving the quality and efficiency of the rural medical-service system. By examining the text-mining results for policies in each period and referring to Li Cuiyu et al.'s ^[17] periodization of rural-doctor policies, and in light of rural-doctor policies and their development requirements in the new era, this study divides them into the above four policy-development periods.

3.2 PMC index calculation

Table 2 Multi-input-output table

First-level variables	X1	X2	X3	X4	X5	X6	X7	X8	X9
Second-level variables	X1: 1	X2: 1	X3: 1	X4: 1	X5: 1	X6: 1	X7: 1	X8: 1	X9: 1

First-level variables	X1	X2	X3	X4	X5	X6	X7	X8	X9
Second-level variables	X1: 2	X2: 2	X3: 2	X4: 2	X5: 2	X6: 2	X7: 2	X8: 2	X9: 2
Second-level variables	X1: 3	X2: 3	X3: 3	X4: 3	X5: 3	X6: 3	X7: 3	X8: 3	X9: 3
Second-level variables	X1: 4			X4: 4		X6: 4	X7: 4	X8: 4	X9: 4
Second-level variables	X1: 5			X4: 5			X7: 5		X9: 5
Second-level variables	X1: 6			X4: 6					
Second-level variables	X1: 7			X4: 7					

The 9 main variables and 40 subvariables constructed in this study are placed into the multi-input-output table. Through text analysis, binary assignment is performed for the subvariables, as shown in Eqs. (1) and (2). Next, the values of the corresponding main variables are obtained by summing the subvariable indices, as shown in Eq. (3). Finally, the values of the 9 main variables are summed to calculate the PMC index of the policy under examination, as shown in Eq. (4)[12]. The specific calculated values of the PMC index model are shown in Table 3. Finally, the grade level of each policy sample is determined according to the calculation results: 0 items are failing, 0 items are passing, 9 items are good, and 1 item is excellent.

$$X \sim N[0, 1] \quad (1)$$

$$X = \{XR : [0, 1]\} \quad (2)$$

$$PI_t = \sum_{j=1}^n [X_{tj}/T(X_{tj})], \quad t = 1, 2, \dots, 9 \quad (3)$$

$$\begin{aligned} PMC = & X_1 \left[\sum_{j=1}^6 (X_{1j}/6) \right] + X_2 \left[\sum_{j=1}^3 (X_{2j}/3) \right] \\ & + X_3 \left[\sum_{j=1}^3 (X_{3j}/3) \right] + X_4 \left[\sum_{j=1}^7 (X_{4j}/7) \right] + X_5 \left[\sum_{j=1}^3 (X_{5j}/3) \right] \\ & + X_6 \left[\sum_{j=1}^4 (X_{6j}/4) \right] + X_7 \left[\sum_{j=1}^5 (X_{7j}/5) \right] + X_8 \left[\sum_{j=1}^4 (X_{8j}/4) \right] \\ & + X_9 \left[\sum_{j=1}^5 (X_{9j}/5) \right] \end{aligned} \quad (4)$$

$$PMC = \begin{bmatrix} PI_1 & PI_2 & PI_3 \\ PI_4 & PI_5 & PI_6 \\ PI_7 & PI_8 & PI_9 \end{bmatrix} \quad (5)$$

$$PMC \text{ concavity index} = 1 - PMC \quad (6)$$

3.3 PMC Surface Plotting

The PMC surface map is a 3×3 matrix transformed from the specific values of the main variables in the PMC index. The surface map can present the shortcomings and advantages of a policy across various dimensions more clearly and three-dimensionally; the evaluation effect of the policy sample can then be judged according to the degree of concavity of the surface map. The calculation of the PMC surface is shown in Eq. (5). The smaller the degree of concavity, the higher the policy grade; the greater the degree of concavity, the lower the policy grade.

To display more intuitively the overall changes in scores among the rural-doctor policy samples, two policies with the most obvious score changes and whose policy effectiveness levels are respectively excellent and good were selected from the 10 policies to be evaluated (P1 and P5). Matlab software was used to draw PMC surface maps for presentation[21] (see Figures 3 and 4). In addition, the mean values of the nine first-level indicators for all sample policies were made into a radar chart. Through the trends in the values of each dimension in the mean radar chart, the existing weak items and the important aspects that need further improvement in the future can be reflected more intuitively, as shown in Figure 5.

Figure 3 P1 PMC surface map

Figure 4 P5 PMC surface map**Figure 5** Mean radar chart of the PMC index of the sample policies

Axis labels in Figure 5: X1: policy nature; X2: policy timeliness; X3: policy perspective; X4: policy content; X5: policy tools; X6: policy evaluation; X7: effectiveness level; X8: issuing agency; X9: policy object.

Table 3. PMC Index of Ten Rural Doctor Policy Samples

Main variable	X1: Policy nature	X2: Policy timeliness	X3: Policy perspective	X4: Policy content	X5: Policy tools	X6: Policy evaluation	X7: Effectiveness level	X8: Issuing agency	X9: Policy object
P1	0.83	1.00	1.00	1.00	1.00	1.00	0.80	0.50	1.00
P2	0.83	1.00	1.00	0.86	0.33	1.00	0.60	0.50	0.80
P3	0.67	1.00	1.00	0.57	1.00	1.00	0.40	0.50	1.00
P4	1.00	1.00	1.00	0.71	1.00	1.00	0.40	0.50	0.40
P5	1.00	1.00	0.67	0.43	1.00	0.75	0.60	0.25	0.80
P6	1.00	1.00	1.00	0.71	0.33	1.00	0.80	0.25	1.00
P7	0.67	1.00	1.00	0.57	1.00	1.00	0.40	0.25	1.00
P8	1.00	1.00	0.67	0.71	0.67	1.00	0.80	0.25	0.80
P9	0.67	1.00	0.67	1.00	1.00	1.00	0.40	0.25	1.00
P10	0.67	1.00	1.00	0.71	1.00	1.00	0.60	0.25	1.00
Mean	0.83	1.00	0.90	0.73	0.83	0.98	0.58	0.35	0.88
Mean rank	5	1	3	7	6	2	8	9	4

Table 4. Ten Rural Doctor Policy Ratings

No.	Policy title	Policy period	PMC index	Depression index	Score rank	Policy grade
P1	<i>Opinions on Further Deepening Reform and Promoting the Healthy Development of the Rural Medical and Health System</i>	High-quality development period	8.13	0.87	1	Excellent
P2	<i>Opinions on Accelerating the Promotion of Rural Talent Revitalization</i>	High-quality development period	6.92	2.08	7	Good
P3	<i>Notice on Implementing the Special Program for College-Student Rural Doctors</i>	High-quality development period	7.14	1.86	3	Good

No.	Policy title	Policy period	PMC index	Depression index	Score rank	Policy grade
P4	<i>Guiding Opinions on Comprehensively Promoting the Construction of Closely Integrated County-Level Medical and Health Communities</i>	High-quality development period	7.01	1.99	5	Good
P5	<i>Opinions on Allowing Medical College Graduates to Apply for Rural Doctor Practice Registration Without Examination</i>	Stable integration period	6.50	2.50	10	Good

No.	Policy title	Policy period	PMC index	Depression index	Score rank	Policy grade
P6	<i>Opinions on Deepening Medical-Education Collaboration and Further Promoting the Reform and Development of Medical Education</i>	Stable integration period	7.09	1.91	4	Good
P7	<i>Guiding Opinions on Further Strengthening the Development of the Rural Doctor Workforce</i>	Deepening and consolidation period	6.89	2.11	9	Good

No.	Policy title	Policy period	PMC index	Depression index	Score rank	Policy grade
P8	<i>Outline of the National Medical and Health Service System Plan (2015-2020)</i>	Deepening and consolidation period	6.90	2.10	8	Good
P9	<i>Implementing Opinions on Further Strengthening the Development of the Rural Doctor Workforce</i>	Deepening and consolidation period	6.98	2.02	6	Good
P10	<i>Opinions on Strengthening the Development of the Rural Doctor Workforce</i>	System construction period	7.23	1.77	2	Good

3.4 Results Analysis

Overall, the PMC index results show that, among the 10 policies to be evaluated, 1 policy reached an excellent level of policy efficacy, and 9 policies reached

a good level; the average PMC index was 6.91. The *Opinions on Further Deepening Reform and Promoting the Healthy Development of the Rural Medical and Health System* had a PMC index of 8.13 and ranked first; the *Opinions on Allowing Medical College Graduates to Apply for Rural Doctor Practice Registration Without Examination* had a PMC index of 6.50 and ranked last. The detailed data are shown in Table 4. The policy-efficacy levels of the 10 policy documents evaluated were all at or above the good level, indicating that since the deepening of medical and health system reform, China's rural doctor policies have, overall, performed positively. The government's overall arrangements and planning for advancing the development of the rural doctor workforce have been relatively scientific and reasonable, and can provide a degree of dynamic support for the sound development of that workforce. Against the broader background of Healthy China, health-oriented poverty alleviation, and rural revitalization, and in the new era of high-quality development of Chinese modernization, high-quality development of the rural doctor workforce has become a consensus.

P1, which was rated excellent—the *Opinions on Further Deepening Reform and Promoting the Healthy Development of the Rural Medical and Health System*—was jointly issued by the General Office of the CPC Central Committee and the General Office of the State Council. Its PMC index was 8.13, and its depression index was 0.87; it ranked first in score among the policies evaluated. The PMC surface chart is shown in Figure 3. Its scores for all 9 main-variable indicators were above the mean, indicating that in the policy modeling evaluation, this policy had relatively good completeness and an excellent level of internal consistency. It had as many as 6 main variables with full scores, specifically reflected in strong policy timeliness, a broad policy perspective, relatively comprehensive policy content, relatively rich policy tools, relatively positive policy evaluation, and fairly comprehensive coverage of policy objects. In addition, it should be noted that because P1 is an opinion-type policy, it did not exhibit a feedback-oriented policy nature; therefore, the score for this indicator was relatively low.

P5, which was rated good—the *Opinions on Allowing Medical College Graduates to Apply for Rural Doctor Practice Registration Without Examination*—was issued independently by the National Health Commission. Its PMC index was 6.5, and its depression index was 2.5; it ranked last in score among the policies evaluated. The PMC surface chart is shown in Figure 4. Among the 9 main-variable indicators, 5 main variables were above the mean, indicating that in the policy modeling evaluation, this policy had good completeness and a relatively high level of internal consistency. It had 3 main variables with full scores, specifically reflected in policy nature, strong policy timeliness, and complete use of policy tools. Because this is a rural doctor policy aimed at medical college students, there are

In cases where policy content coverage is incomplete, the policies mainly focus on talent education and training, improvement of remuneration, and supervision and management, while insufficient attention is paid to infrastructure construc-

tion, old-age security, financial subsidies, and institutional development. Other shortcomings are also reflected in the lack of a comprehensive policy perspective. The policies are mainly formulated from a macro perspective of promoting employment among college graduates and supplementing and optimizing the rural doctor workforce, as well as from micro perspectives such as practice registration requirements, training and assessment, and implementation of subsidy benefits; however, meso-level perspectives on how to achieve platform development and talent-management mechanisms are lacking. In terms of policy evaluation, overall, the policies have adequate basis, clear objectives, and scientific plans, but the policy texts are generally short, and the plans are not yet sufficiently detailed and specific. In addition, with respect to issuing bodies, the policies were issued independently by the National Health Commission, and therefore this dimension received a relatively low score.

Judging from the radar mean chart for all sample policies (Figure 5), the mean values of the main variables in the policy modeling indicator system, ranked from high to low, are: policy timeliness > policy evaluation > policy perspective > policy object > policy nature > policy tools > policy content > level of effect > issuing body (Table 3). Among the 10 policies to be evaluated, the PMC index scores in four dimensions—X2 policy timeliness, X3 policy perspective, X6 policy evaluation, and X9 policy object—show an obvious advantage, with mean values exceeding 0.85. This indicates that the selected policies to be evaluated generally have the characteristics of relatively long policy timeliness and relatively positive policy evaluation, and can better cover broad policy objects from multidimensional macro-, meso-, and micro-level policy perspectives. In the dimensions of X1 policy nature and X5 policy tools, the mean values are both 0.83, indicating that there is still room for improvement in the exertion of policy nature and the comprehensive application of policy tools. In addition, the scores for X4 policy content, X7 level of effect, and X8 issuing body are relatively low, at 0.73, 0.58, and 0.35, respectively. The analysis finds that current rural doctor policies do not comprehensively cover relevant content, especially with regard to infrastructure construction; policy issuing bodies are relatively independent, with insufficient collaboration among institutions and departments; and the level of policy effect is concentrated at the level of departmental rules and industry regulations. Most policies focus on grasping the current situation, while laws, regulations, and administrative regulations are lacking, and forward-looking judgments about policy impact are relatively weak [22].

4 Discussion and Policy Recommendations

4.1 Give full play to the various attributes of policies and realize an optimized combination of supply-side, demand-side, and environmental policy tools

Among the three types of policy tools, demand-side policy tools play a pulling role and are used most frequently, with a total of 18 responses, accounting for

45%. Supply-side policy tools directly promote the development of the rural doctor workforce, with 13 responses, accounting for 32.5%. Environmental policy tools exert an indirect influence [5] and are used relatively less frequently, with 9 responses, accounting for 22.5%. In addition, in terms of the exertion of policy attributes, the use of advisory, supervisory, descriptive, and guiding functions is concentrated, while predictive and feedback functions are relatively lacking. In summary, while maintaining the frequency of use of the first two types of policy tools, it is necessary to reasonably increase the combined use of environmental policy tools such as goal planning, organizational support, regulatory control, and policy publicity. Core needs should be analyzed, forward-looking thinking and feedback thinking should be strengthened, and the predictive, advisory, feedback, supervisory, descriptive, and guiding attributes of policies should be comprehensively coordinated and brought into play, so as to fully leverage the guiding advantages of policies. Policy information, implementation status, and effectiveness evaluation results should be disclosed in a timely manner to improve policy transparency. New media, social platforms, and other channels should be used to expand the coverage and influence of policy publicity, and multiple approaches and channels should be adopted to innovate and cultivate a favorable atmosphere for the development of the rural doctor workforce.

4.2 Focus on strengthening infrastructure construction and dynamically improve supporting policy measures

Judging from the policy content indicators, the situation is relatively good in terms of talent education and training, financial subsidies, and supervision and management. However, old-age security and institutional development are relatively weak, and policy coverage is not sufficiently comprehensive; in particular, infrastructure construction has the lowest sub-item score. In this regard, in developing the rural doctor workforce, attention should be paid to improving weak links and addressing shortcomings. Resource funding and social capital should be directed toward the grassroots front line. Through methods such as the establishment of special funds by the government and the encouragement and guidance of multiple parties to raise funds, efforts should be accelerated to make up for shortcomings in rural infrastructure and basic public health service equipment. Attention should be paid to improving specialized equipment for infectious diseases, epidemics, and local endemic diseases, and to strengthening the standardized construction of village clinics. An organizational system should be established and improved, boundaries of powers and responsibilities should be clarified, old-age security for village doctors should be dynamically improved, and responsibility implementation should be strengthened. Strict management should be combined with care and support, and the construction of accountability systems and incentive-and-care mechanisms should be strengthened.

4.3 Introduce laws and regulations targeting the development of the rural doctor workforce and optimize the structure of policy effect

Judging from the policy effect indicators, the structure of the policy effect of the policies to be evaluated is overly concentrated at the level of normative documents and industry regulatory documents, and is especially deficient in terms of laws and regulations. Research by Liu Lanqiu et al. shows that rural doctors face legal difficulties in their practice activities with regard to practice qualifications, practice locations, practice scope, and assumption of responsibility [23–24]. Rural doctors bear work responsibilities similar to those of township health centers. However, when facing medical risks in the course of practice, township health centers have corresponding legal procedures to provide support, and their risk protection is relatively sound [25], whereas rural doctors appear to be “fighting alone.” In this regard, it is necessary to optimize the structure of policy effect. Based on the current standards of the rural medical and health system, in-depth frontline investigations should be conducted to understand and grasp the actual difficulties and needs of rural doctors. A demand-oriented, goal-oriented, and effect-oriented approach should be upheld, and laws and regulations related to rural doctors should be revised and improved. Medical risk prevention and control training courses and lectures should be organized regularly, and medical experts and legal consultants should be invited to explain to rural doctors knowledge and skills related to the prevention and handling of medical accidents and legal rights protection, thereby creating a sound rule-of-law environment for rural doctors to practice in accordance with the law and safeguard their legitimate rights and interests.

4.4 Strengthen communication and cooperation among policy-issuing bodies and enhance organizational coordination capacity

Judging from the indicator of policy-issuing bodies, the issuing bodies for policies on China’s rural doctor workforce are relatively single and independent, and the coordination density among the various policy-issuing bodies still needs to be further improved. Cross-departmental coordination is an important means of improving the fragmentation of division of labor among government departments, increasing work efficiency, and enhancing collaborative governance capacity [2]. Among the 10 policies to be evaluated, P1 was jointly issued by the General Office of the CPC Central Committee and the General Office of the State Council, while P3 was jointly issued by five departments. These two policies rank relatively high in the PMC index, which indirectly indicates that cross-institutional and cross-departmental cooperation can, to a certain extent, improve the hierarchical level and breadth of policies. Therefore, it is necessary to fully consider the complexity of building the rural medical system, the diversity of rural doctors’ needs, and so on, and fully consider rural doctors’

needs, institutional needs, and development needs; establish a concept of cross-departmental policy collaboration; fully consider the forward-looking, holistic, and cooperative nature of policies; and promote communication and cooperation

among institutions and departments. The collaborative mechanism for cross-departmental policy formulation and release should be continuously optimized, a cross-departmental platform for policy formulation and release should be built, and efficient decision-making procedures should be established to coordinate policy formulation, thereby further improving policy quality and enhancing the degree of coordination in policy formulation and implementation.

5 Summary

Based on the PMC index model, this study conducted a quantitative policy evaluation of 10 core rural-doctor policies issued at the national level in China since the deepening of the reform of the medical and health system. The study found that China's rural-doctor policies, as a whole, demonstrate good internal consistency and planning scientificity. In particular, they perform well in terms of policy timeliness, multidimensional perspectives, and coverage of policy objects, reflecting a certain degree of foresight and systematic design and providing support for the stability and development of the rural-doctor workforce. However, the evaluation results also reveal shortcomings, such as uneven coverage of policy content, insufficient coordination among issuing agencies, and an overall low hierarchy of policy effectiveness, which constrain the overall efficacy and sustainability of the policy system. On this basis, this study proposes targeted recommendations in such areas as optimizing the combination of policy tools, addressing shortcomings in the construction of basic infrastructure, strengthening legislative guarantees, and reinforcing cross-departmental coordination. These recommendations aim to provide empirical reference for future policy formulation, optimization, and coordinated implementation, promote high-quality development of the rural-doctor workforce, and strengthen the foundation of the primary-level medical and health service network.

The limitations of this study are mainly as follows: the study sample is limited to core policies at the national level. Although it has a certain degree of representativeness, it does not cover all relevant policy texts, especially local policies; therefore, the comprehensiveness of the sample may be limited.

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