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Quantitative Evaluation of China's Policies for Disease Control Supervisors in Medical Institutions: A PMC Index Model Approach

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Abstract:

Background: The disease control supervisor system in medical institutions is a central institutional innovation of China's disease control reform, designed to integrate medical treatment with disease prevention. Since its pilot launch in 2023, the system has expanded rapidly, but the design quality of the pilot policy documents remains unevaluated. This study uses the Policy Modeling Consistency (PMC) index model to evaluate these pilot policies and provide evidence for policy refinement ahead of nationwide scale-up.

Methods: We collected 24 pilot policy texts issued across 24 pilot regions in China between 2023 and 2025 from official government sources and screened them against predefined inclusion and exclusion criteria. We constructed a PMC evaluation framework with nine primary variables and 46 secondary variables. Each secondary variable was binary-coded (1 = satisfied, 0 = otherwise), and primary-variable scores and the overall PMC index were calculated under an equal-weight assumption. Policies were classified into quality levels according to standard PMC rating criteria, and a grouped 3D projection-smooth matrix supported horizontal, vertical, and cross-group comparisons.

Results: The PMC indices of the 24 policies ranged from 5.04 to 7.82, with a mean of 6.33; four policies were rated Excellent and twenty were rated Great. Policy Tool (X7, mean 0.83) was the strongest dimension, and Policy Aim (X2, 0.57) and Policy Function (X6, 0.60) were the weakest. Policy Function showed the greatest inter-policy divergence (range 0.75). Policy Evaluation (X9) most sharply distinguished Excellent from Great policies (0.95 vs. 0.68), and the completeness of evaluation-related elements largely determined policy quality.

Conclusions: The pilot policies of the disease control supervisor system are generally well designed but strategically incomplete: operational specificity is strong, while long-term

objectives, function clarification, and incentive design are weak. Future refinements should strengthen policy evaluation elements, articulate long-term aims, build a dedicated workforce, and embed supervision within integrated care structures.

Keywords
Disease control supervisor; Medical institutions; PMC index model; Policy evaluation; Treatment–prevention integration; China

1. Introduction

The COVID-19 pandemic exposed weaknesses in public health systems worldwide and renewed calls for stronger pandemic preparedness and health system resilience [1,2]. Preparedness frameworks developed during this period make the same point: an effective response rests on integrated surveillance, early warning, and response functions across institutions, backed by sustained investment in the public health workforce [3,4].

China's experience illustrates this challenge. Despite decades of public health achievement, the system has long been characterized by a separation of clinical treatment from disease prevention-the treatment-prevention divide-and by a disease control workforce that has shrunk relative to the health system as a whole [5,6]. In response, China launched a structural reform of its disease control system: the National Bureau of Disease Control and Prevention was established in 2021, and in December 2023 the State Council issued the Guidelines for High-Quality Development of Disease Prevention and Control, which explicitly call for innovating mechanisms of treatment-prevention collaboration and integration [7].

A central element of this reform is the disease control supervisor system in medical institutions. The system was first piloted in nine provinces in 2023 and has since expanded to all provinces. Local centers for disease control and prevention assign full- and part-time supervisors to public hospitals, primary care facilities, and private hospitals, where they oversee statutory disease control duties and enforce reporting requirements [8]. The system is one way to integrate medical treatment and disease prevention, a topic that has drawn wide attention in studies of integrated primary care and chronic disease management in China [9,10,11]. Whether the pilot policies are well designed matters, because their quality will shape national scale-up. A systematic evaluation of these policy documents is therefore needed; in integrated care settings, well-designed instruments are linked to more prevention-oriented service behavior [12]. The Policy Modeling Consistency (PMC) index model converts policy texts into multidimensional scores, reducing the subjectivity of expert judgment [13].

Since its introduction by Ruiz Estrada, the model has been widely applied to Chinese health policies, including hospital workplace violence prevention [14], the hierarchical medical system [15], public health emergency response [16], population health [17], and municipal health impact assessment [18]. Recent work extends the model to other domains: traditional medicine in emergencies [19], hospice care [20], two-way referral [21], health insurance

payment reform [22], smart older-adult care [23], fertility policy [24], traditional Chinese medicine industry development [25], rural public sports services [26], and adolescent physical activity [27]. Across these studies, Chinese health policies show similar strengths in operational content and similar weaknesses in incentive design and long-term objectives..

No published PMC-based evaluation has yet examined the disease control supervisor system. Work on this new institution has focused on implementation problems, such as workforce shortages, unclear responsibility boundaries, and weak incentive mechanisms [28,29], while the internal consistency of the pilot policy documents remains untested [30,31]. Left unevaluated, these texts could lead nationwide scale-up to repeat design flaws instead of spreading best practices.

To fill this gap, we scored 24 pilot policy texts issued across 24 pilot regions between 2023 and 2025. Our four aims were to build a PMC framework with nine primary and 46 secondary variables, compute the PMC index and quality level of each policy, map dimension-level strengths and weaknesses with a grouped 3D projection-smooth matrix, and draw implications for refining the system before scale-up.

2. Materials and methods

2.1 Data sources and sample selection

We examined 24 policy documents from the Pilot Program on the Disease Control Supervisor System in Medical Institutions, one per pilot region. Texts came from the official websites of regional governments and their health agencies, including health commissions, disease control and prevention bureaus, health supervision offices, and centers for disease control and prevention, with a few documents collected from selected pilot medical institutions. We also searched the National Laws and Regulations Database of China, the Peking University Law Database (PKULaw), and general-purpose search engines such as Baidu, using the search terms "disease control supervisor", "medical institution", "pilot", and "treatment-prevention integration". The search covered the period from the program's launch in 2023 to 2025.. The Chinese search terms used were "疾控监督员", "医疗机构" "试点", and"医防融合"; the last search was performed on on 30 December 2025.

All retrieved texts were screened against a set of inclusion and exclusion criteria. A document was retained if it (1) was issued by a pilot-region government or its health or disease-control department and directly concerned the disease control supervisor system, and (2) contained substantive, actionable implementation content. Documents were excluded if they were (1) purely procedural, such as meeting notices; (2) duplicative of earlier versions without substantive updates; or (3) lacking implementation content. Of the 56 candidate documents initially identified through these searches, 22 were excluded after screening (duplicates, procedural notices, or documents lacking implementation content), leaving 24 policy texts from 24 pilot regions for analysis (Table 1).

2.2 Variable classification and parameter identification

The selection of evaluation variables followed the standard PMC index modeling framework

proposed by Ruiz Estrada [13] and was adapted to the disease control supervisor pilot program in medical institutions. Drawing on the document requirements issued by the National Disease Control and Prevention Administration and the National Health Commission for this program, and referring to prior PMC-based policy evaluations [14-17,31,32], we established nine primary variables and 46 secondary variables (Table 2).

The nine primary variables are as follows. Policy Nature (X1) captures the tone of the text: task-oriented, suggestive, guiding, supporting, or predictive. Policy Aim (X2) records responsibilities, team building, capacity enhancement, and outcome innovation. Policy Content (X3) tracks overall requirements, pilot scope, main tasks, timeline, and work requirements. Policy Object (X4) lists the stakeholders involved, including health commissions, disease control bureaus, TCM administrations, health inspection institutes, medical institutions, centers for disease control and prevention, and disease control supervisors. Policy Safeguard (X5) covers coordination, division of labor and collaboration, evaluation and monitoring, experience summary, promotion and application, and publicity and reporting. Policy Function (X6) concerns the mechanisms to be optimized, assessed, enhanced, and improved, while Policy Tool (X7) covers coordination of personnel sources, standardization of work responsibilities, clarification of qualification requirements, strengthened training and assessment, coordination of deployment methods, and reinforcement of responsible entities. Policy Constraint (X8) covers effectiveness tracking, information sharing, and disciplinary and incentive mechanisms. Policy Evaluation (X9) includes clear objectives, an adequate basis, detailed content, clear rights and responsibilities, and scientific plans.Policy Safeguard (X5) and Policy Constraint (X8) both mention monitoring, but they do different work. X5 asks whether the operational guarantees for running the program are in place; X8 asks whether binding oversight, discipline, and incentive mechanisms exist. The two dimensions correlated negatively across the 24 policies (Pearson $r = -0.24$), so they are unlikely to double-count the same content.

We broke each primary variable into secondary variables and scored them as binary indicators: 1 when the policy text addressed the element, 0 otherwise. Table 2 gives the full definitions and evaluation criteria for all 46 secondary variables.

To control coding subjectivity, two authors (Huang Min and Yang Guofeng) independently coded all 24 policy texts against the 46 binary indicators. Inter-rater agreement was substantial (Cohen's $\kappa = 0.75$, 88.7% agreement), and disagreements were resolved through discussion with a third author (Liu Yingzhe) before the final codes were entered into the multi-input-output table (Table 4). Four indicators of Policy Object (X4) reflect institutional elements that are legally mandatory for all pilot regions (health commissions, medical institutions, centers for disease control and prevention, and the supervisors themselves) and were therefore satisfied by every policy text. These indicators add a constant of 0.0635 to each PMC score; as a constant shift, they affect neither the ranking nor the classification of policies, and excluding them leaves the Excellent group unchanged (P2, P3, P6, P17).

2.3 Multi-input-output table construction

Following the PMC index modeling procedure, the 46 binary indicators defined above were organized into a multi-input-output framework, whose variable structure is summarized in Table 3. The indicators were then arranged into a multi-input-output table, with the 46 secondary variables as rows and the 24 policy texts as columns (Table 4). In line with the PMC index model, all primary and secondary variables were assigned equal weights, on the assumption that every dimension of policy content contributes equally to overall policy quality. The resulting table provides the data basis for the subsequent PMC index calculation.

2.4 PMC index calculation

Based on the multi-input-output table, the score of each primary variable was calculated as the proportion of its secondary variables that were satisfied:

Equation (1):

$$X_i = \frac{1}{T_i} \sum_{j=1}^{T_i} X_{ij}, \quad (i = 1,2,\ldots,9)$$

where T_i denotes the number of secondary variables under primary variable X_i, and $X_{ij} \in \{0, 1\}$ indicates whether the policy satisfies the j-th secondary variable of X_i (1 = satisfied, 0 = otherwise).

The overall PMC index of each policy was then obtained by summing the nine primary-variable scores:

Equation (2):

$$\mathrm{PMC} = \sum_{i=1}^{9} X_i$$

Accordingly, the PMC index ranges from 0 to 9, with higher values indicating greater policy consistency. Equal weights were assigned to all nine primary variables, following the original PMC framework proposed by Ruiz Estrada [13], so that the resulting indices remain directly comparable with those reported in prior PMC-based evaluations of Chinese health policies [14,16,20].

2.5 Policy classification

Following the PMC index rating criteria, the policy texts were classified into five levels according to their PMC index scores: Poor (0-2.99), Acceptable (3-4.99), Great (5-6.99), Excellent (7-8.99), and Perfect (9-10.00), as detailed in Table 6. Based on the calculated scores, the 24 policy texts in this study fell into the Excellent and Great levels.

2.6 3D projection-smooth matrix construction

To visualize the evaluation results, we constructed a three-dimensional projection-smooth matrix, an extension of the conventional per-policy PMC surface. For each classification group, we assembled a two-dimensional score matrix $M \in Rn \times 9$ whose rows are the n policies (ranked in descending order of PMC index) and whose columns are the nine primary variables (X1-X9); each entry is the normalized primary-variable score.Each discrete matrix was bilinearly interpolated into a smooth surface and projected onto the X-Z and Y-Z planes, which makes dimension- and policy-specific scores easy to read. The Great group (n = 20) was then split into two panels of ten policies each, giving three panels overall: Excellent (n = 4), Great-a

(n = 10), and Great-b (n = 10) (Figures 1-3).

The resulting matrix supports three kinds of comparison. Horizontal comparison reads the strengths and weaknesses of one policy across the nine dimensions; vertical comparison captures inter-policy divergence within a dimension; cross-panel comparison separates the Excellent and Great groups. The policy axis is discrete, so the interpolation serves visualization only and does not imply a continuous scale.

3. Results

3.1 Overall PMC index and policy ranking

Across the 24 policy texts, PMC indices ran from 5.04 to 7.82 (mean 6.33). P2 (Hebei Province) led at 7.82, ahead of P3 (Guangxi Zhuang Autonomous Region, 7.63), P6 (Nanning City, 7.15), and P17 (Baiyin District, Baiyin City, 7.09); P9 (Tengchong City) closed the list at 5.04. Table 5 reports the primary-variable scores, PMC indices, and rankings of all 24 policies.

Two checks tested how much the ranking depends on weighting choices. Dropping Policy Evaluation (X9) from the total score left P2 and P3 in the top two, but P21 climbed from fifth to third, P6 slipped from third to fourth, and P17 fell to sixth behind both P21 and P4; P17's Excellent rating therefore rests partly on its strong evaluation design. This matches the Section 3.3.3 finding that Policy Evaluation is the sharpest separator of policy quality. Re-ranking with entropy weights derived from each dimension's between-policy dispersion produced much the same order: Spearman $\rho = 0.90$, and all four Excellent policies stayed within the top seven. The headline conclusions thus hold under alternative weighting schemes.

3.2 Policy classification results

According to the classification criteria (Table 6), 4 of the 24 policy texts were rated as Excellent (PMC index ≥ 7.0): P2 (Hebei Province, 7.82), P3 (Guangxi Zhuang Autonomous Region, 7.63), P6 (Nanning City, 7.15), and P17 (Baiyin District, Baiyin City, 7.09). The remaining 20 policy texts were rated as Great (5.0 ≤ PMC index < 7.0). None of the policies fell into the Poor, Acceptable, or Perfect levels.

The threshold of 7.00 follows the rating criteria used in prior PMC-based evaluations. Within the plausible range of 6.90–7.10, P2 and P3 remain Excellent under every cutoff, whereas the classification of P6 (7.15) and P17 (7.09) is threshold-sensitive; P17 sits marginally above the cutoff. We therefore interpret the Excellent group as a graded boundary rather than a discrete class, and our substantive conclusions rest on the stable top two (P2, P3) and the continuous ranking rather than on the exact count of Excellent policies.

3.3 3D projection-smooth matrix analysis

The 3D projection-smooth matrices of the 24 policies are presented in Figures 1-3: Figure 1 shows the four Excellent policies, and Figures 2 and 3 show the twenty Great policies (split into two panels of ten for readability). Three levels of comparison are reported below.

3.3.1 Horizontal analysis

Across all 24 policies, the nine primary variables showed a broadly consistent profile. Policy Tool (X7, mean 0.83) and Policy Content (X3, 0.80) scored highest, followed by Policy Nature (X1, 0.73) and Policy Evaluation (X9, 0.73). The lowest-scoring dimensions were Policy Aim (X2, mean 0.57) and Policy Function (X6, 0.60). The pilot policies were thus strongest in specifying policy tools and weakest in clarifying policy objectives and functions.

3.3.2 Vertical analysis

Policy Function (X6, range 0.75) showed the greatest inter-policy divergence, followed by Policy Tool (X7, 0.67) and by Policy Nature, Policy Content, and Policy Evaluation (X1, X3, X9; each 0.60). These five dimensions varied most across policies. Policy Object (X4, range 0.43) showed the least divergence, with relatively uniform coverage of stakeholders across policies.

3.3.3 Cross-group comparison

Comparing the Excellent and Great groups, the largest gap was in Policy Evaluation (X9: 0.95 vs. 0.68, difference 0.27), followed by Policy Safeguard (X5: 0.79 vs. 0.61, difference 0.18) and Policy Function (X6: 0.75 vs. 0.58, difference 0.17). Excellent policies thus differed from Great policies mainly in the completeness of policy evaluation rather than in policy content or tools, which were relatively strong across all policies.

4. Discussion

4.1 Interpretation of main findings

The mean PMC index of 6.33 indicates that the 24 disease control supervisor pilot policies are at a moderate level of consistency, with clear room for improvement. This is consistent with the early stage of the reform: the pilot program was launched only in 2023 [33], and the institutional framework is still taking shape [7].

These policies are strongest in their operational specificity. Policy Tool (X7) scored highest (0.83): pilot regions invested most in specifying how supervisors should be selected, trained, deployed, and held accountable. This operational focus follows from the central government's requirements, which put the practical machinery of supervision ahead of broader institutional design [9,10,11].

In contrast, Policy Aim (X2, 0.57) and Policy Function (X6, 0.60) scored lowest, a pattern that fits the structural challenges already documented for this system: unclear responsibility boundaries, a shortage of qualified personnel, and underdeveloped incentive and career mechanisms [5,8,28,29]. The pilot policies spell out the "how" of supervision better than the "why", and long-term goals such as team building and capacity enhancement remain thin.

Finally, the sharpest gap between the Excellent and Great groups appeared on Policy Evaluation (0.95 vs. 0.68): texts that scored high spelled out clear objectives, an adequate

evidence base, and precise rights and responsibilities. Municipal health impact assessment policies show the same pattern, with regions that articulated these elements achieving higher overall consistency [18].

4.2 Policy implications

The findings point to several ways to refine the disease control supervisor system.

First, the weakest dimensions, Policy Aim and Policy Function, call for stronger top-level design. Pilot regions should spell out what the supervisory system is for beyond day-to-day oversight: team building, capacity enhancement, and outcome innovation. A nationally consistent definition of the supervisor's function matters just as much; where the function stays vague, supervision quality becomes uneven, and the wide divergence on X6 across policies shows this risk. A unified duty catalogue, aligned with the responsibilities listed in the national guidelines for high-quality development of disease prevention and control, would give all pilot regions a common reference.

Second, since Policy Evaluation is what most sharply separates Excellent from Great policies, every implementation plan should treat evaluation-related elements as essential. Each pilot plan should state measurable objectives, cite its legal and evidence basis, and specify who is responsible for what. The expanding use of PMC-based evaluation across health policy domains takes the same view: the completeness of evaluation elements serves as a core indicator of policy quality [19].

Third, the human resource bottleneck needs attention. The disease control workforce has long been shrinking relative to the health system as a whole [6,29], and county-level distribution remains unequal [6,34,35,36,37]. Because the supervisory system depends largely on staff seconded from CDCs, pilot regions should build a dedicated talent pool, open clear career pathways, and provide continuing training. Job preference evidence indicates that career prospects matter more than income alone in the choices of public health graduates [30,38].

Fourth, incentive mechanisms should be strengthened rather than assumed. Studies in CDC and primary public health settings consistently show that salary levels, job satisfaction, and burnout jointly shape turnover intentions [39,40,41,42]. Supervisors who take on additional duties inside medical institutions are unlikely to remain committed without commensurate remuneration, workload recognition, and career advancement channels.

Finally, the supervisor system should be embedded in, rather than added onto, the broader movement toward integrated care. Evidence from county medical communities indicates that integrated management improves outcomes for chronic conditions [12,43,44,45], and that capitation-based payment can steer service behavior toward prevention [46]. If supervisors work within such integrated structures instead of as a parallel inspection layer, supervision would fit the daily operation of medical institutions and the system could become sustainable [47].

These directions would move the pilot program beyond its operationally complete but strategically incomplete stage toward a mature institutional design [48].

4.3 Comparison with existing PMC studies

The overall PMC index obtained in this study (mean 6.33) is comparable with those reported for other Chinese health policies. Public health emergency response policies scored 6.43 [16], hierarchical medical system policies 6.53 [15], and municipal health impact assessment policies 6.89 [18]. Hospice care policies scored higher (7.20) [20], and smart older-adult care policies higher still [23]. Chinese health policies thus cluster in the 6 to 7 range of the PMC scale across domains, and the supervisor pilot policies are not atypical in overall design quality.

The variable framework adopted here (nine primary and 46 secondary variables) also matches prior applications, which range from 9 + 40 for population health policies [17] to 10 + 52 for hospital workplace violence policies [14], 10 + 40 for traditional medicine emergency policies [19], and 10 + 47 for hospice care policies [20]. Core dimensions, such as policy nature, content, and evaluation, appear in nearly all frameworks, which shows how central they are to policy consistency.

At the dimension level, the patterns observed here match earlier findings. The weakness of incentive-related elements appears repeatedly: public health emergency policies scored lowest on incentive measures [16], and hospice care policies showed unsatisfactory performance in policy guarantee [20]. Likewise, policy objectives and functions were the most divergent dimensions in population health policies [17], which matches our finding that Policy Aim (X2) and Policy Function (X6) were the weakest dimensions of the supervisor policies.

By contrast, the discriminating role of Policy Evaluation, the dimension that most sharply separates Excellent from Great policies, has few direct precedents, because most existing studies report overall rankings rather than the determinants of between-policy variation.Policy Evaluation (X9) is the only dimension that measures how rigorously a text is drafted, not which topics it covers. Part of its discriminating power may simply reflect that better-drafted texts score higher on other criteria too, but the Section 3.1 check, where top-ranked policies keep their positions after dropping X9, shows the dimension adds information beyond the other eight. The grouped 3D projection-smooth matrix adds a further methodological gain: placing many policies in one coordinate system shows the between-group structure that conventional per-policy PMC surfaces miss.

The wider PMC literature, covering two-way referral [21], digital rural sports services [26], adolescent physical activity [27], traditional Chinese medicine industry development [25], fertility policy [24], and health insurance payment reform [22], shows the same adaptability [49,50]. These studies repeatedly find the same strengths (operational specificity) and the same weaknesses (incentive design and long-term objectives). The present study adds the disease control supervisor system to this growing body of quantitative policy evaluations.

5. Conclusion

This study applied the PMC index model to quantitatively evaluate 24 policy texts of the disease control supervisor system pilot program in China. The overall PMC index (mean 6.33) indicates that the pilot policies are generally well designed, comprising four Excellent and twenty Great policies. The policies are strongest in specifying policy tools, yet weakest in clarifying policy aims and functions; Policy Evaluation emerged as the dimension that most sharply distinguishes high-quality from moderate policies. By replacing conventional per-policy PMC surfaces with grouped 3D projection-smooth matrices, the study offers a visualization approach that supports horizontal, vertical, and cross-group comparisons.

Several limitations should be noted. First, the evaluation reflects the internal consistency of policy texts rather than actual implementation; the gap between policy design and field execution requires separate investigation [51]. Second, the sample covers 24 pilot regions, a fraction of the 254 cities that had joined the program by 2024, as publicly reported by the National Disease Control and Prevention Administration, and may not represent the full national landscape; some provinces contributed several pilot regions (e.g., four in Zhejiang and three in Shanghai), so regional clustering may further limit generalizability. Moreover, because the sample was restricted to publicly available full texts, the mean PMC index of 6.33 may overestimate the average design quality of all pilot policies if unpublished documents tend to be less thoroughly drafted. Third, although the variable framework was based on official documents and prior studies, the binary coding of secondary variables inevitably involves some subjectivity [52]. Fourth, the interpolation used in the 3D matrix serves visualization only and does not imply a continuous policy scale.

Future work could proceed in three directions: expanding the sample to all pilot cities and tracking policy evolution across the two rounds of the pilot program; combining text-based evaluation with field evidence on supervisor deployment, inspection frequency, and rectification outcomes; and linking policy consistency scores with implementation indicators, as in the policy-text-and-action approach of Fu et al [15].

6. Declarations

Ethics approval and consent to participate

Not applicable. This study analyzed publicly available policy documents and involved no human participants or personal data.

Consent for publication

Not applicable.

Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request. The 46 × 24 binary coding matrix underlying all PMC scores is

provided as Additional file 1.

Competing interests

The authors declare no competing interests.

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Authors' contributions

Huang Min conceived and designed the study, collected and screened policy documents, performed PMC index calculation and 3D matrix visualization, and drafted the original manuscript. Fang Mei collected and screened policy documents and participated in manuscript writing. Li Xinghao carried out manuscript proofreading and logical revision. Chen Yan was responsible for data quality control and data verification. Yang Guofeng and Liu Yingzhe critically revised the manuscript for important intellectual content; both served as co-corresponding authors. All authors have read and approved the final version of the manuscript.

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AI use declaration

During the preparation of this work, the authors used an AI-assisted language tool to improve the readability and language of the manuscript. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Tables

Table 1 Selected Policy Texts from the Pilot Regions.

Code	Name of policy	Source of Publication
P1	Notice on Issuing the Guidelines for Disease Control Supervisors in Shanghai Medical Institutions	Shanghai Municipality
P2	Notice on Issuing the Supporting Documents for the Pilot Program of the Disease Control Supervisor System in Medical Institutions of Hebei Province	Hebei Province
P3	Notice on Issuing the Implementation Plan for the Pilot Program of the Disease Control Supervisor System in Medical Institutions of the Guangxi Zhuang Autonomous Region	Guangxi Zhuang Autonomous Region
P4	Notice of the Lianyungang Municipal Health Commission on Issuing the Implementation Plan for the Pilot Program of the Disease Control Supervisor System in Lianyungang Medical Institutions	Lianyungang City
P5	Notice of the Yueqing Municipal Health Bureau on Comprehensively Implementing the Disease Control Supervisor System in All Medical Institutions Citywide	Yueqing City
P6	Notice of the Nanning Municipal Health Commission on Issuing the Implementation Plan for the Pilot Program of the Disease Control Supervisor System in Nanning Medical Institutions	Nanning City
P7	Notice of the Dunhuang Municipal Health Bureau on Issuing the Implementation Plan for the Pilot Program of the Disease Control Supervisor System in Dunhuang Medical Institutions	Dunhuang City
P8	Notice of the Longnan Municipal People's Government on Implementing the Pilot Program of the Disease Control Supervisor System in Medical Institutions of Longnan City	Longnan City
P9	Notice of the Tengchong Municipal Health Bureau on Issuing the Implementation Plan for the Pilot Program of the Disease Control Supervisor System in Tengchong Medical Institutions	Tengchong City
P10	Notice of the Jinshan District Health Commission of Shanghai on Issuing the Pilot Work Plan for the Disease Control Supervisor System in	Jinshan District, Shanghai

	Medical Institutions of Jinshan District	
P11	Notice of the Changning District Health Commission of Shanghai on Issuing the 2024 Pilot Work Plan for the Disease Control Supervisor System in Changning District Medical Institutions	Changning District, Shanghai
P12	Notice of the Putuo District Health Bureau of Zhoushan City on Issuing the 2024 Pilot Work Plan for the Disease Control Supervisor System in Putuo District Medical Institutions	Putuo District, Zhoushan City
P13	Notice of the Fenghua District Health Bureau of Ningbo City on Issuing the Implementation Plan for the Disease Control Supervisor System in Medical Institutions of Fenghua District	Fenghua District, Ningbo City
P14	Notice of the Dafeng District Health Commission of Yancheng City on Issuing the Implementation Plan for the Disease Control Supervisor System in Dafeng District Medical Institutions	Dafeng District, Yancheng City
P15	Notice of the Shushan District Health Bureau on Issuing the 2024 Implementation Plan for the Pilot Program of the Disease Control Supervisor System in Shushan District Medical Institutions	Shushan District, Hefei City
P16	Notice of the Yuanzhou District Health Commission of Yichun City on Issuing the Implementation Plan for Advancing the Disease Control Supervisor System in Medical Institutions of Yuanzhou District	Yuanzhou District, Yichun City,
P17	Notice of the Baiyin District Health Bureau of Baiyin City on Issuing the Pilot Implementation Plan for the Disease Control Supervisor System in Medical Institutions of Baiyin District	Baiyin District, Baiyin City
P18	Notice of the Pingchuan District Health Bureau of Baiyin City on Launching the Pilot Program of the Disease Control Supervisor System in Medical Institutions	Pingchuan District, Baiyin City
P19	Notice of Xiaoxian County Health Commission on Issuing the 2024 Implementation Plan for the Pilot Program of the Disease Control Supervisor System in Xiaoxian County Medical Institutions	Xiao County, Suzhou City
P20	Notice of Xiuning County Health Commission on Issuing the Pilot Implementation Plan for the Disease Control Supervisor System in Xiuning County Medical Institutions	Xiuning County, Huangshan City
P21	Notice of the Dongzhi County Health Commission on Issuing the 2024 Implementation Plan for the Pilot Program of the Disease Control Supervisor System in Dongzhi County Medical Institutions	Dongzhi County, Chizhou City,

P22	Notice of Zhenghe County Health Bureau on Issuing the Disease Control Supervisor System for Medical Institutions of Zhenghe County	Zhenghe County, Nanping City,
P23	Notice of Ganquan County Health Bureau on Issuing the 2024 Pilot Work Plan for the Disease Control Supervisor System in Ganquan County Medical Institutions	Ganquan County, Yan'an City
P24	Notice of Fu County Health Bureau on Issuing the Pilot Implementation Plan for the Disease Control Supervisor System in Fu County Medical Institutions	Fu County, Yan'an City

Table 2 Primary and secondary variables and evaluation criteria.

Primary Variable	Secondary Variable	Two-Level Variable Evaluation Criteria
Policy Nature (X1)	X1-1 Task-oriented	Whether it contains task-oriented content (e.g., key tasks, main objectives, etc.): 1 = yes, 0 = no.
	X1-2 Suggestion	Whether it contains suggestive content (e.g., encouragement, advocacy, etc.): 1 = yes, 0 = no.
	X1-3 Guidance	Whether it contains guiding content (e.g., coordinated promotion, strengthened leadership, etc.): 1 = yes, 0 = no.
	X1-4 Support	Whether it contains supportive content (e.g., strong support, policy guarantees, etc.): 1 = yes, 0 = no.
	X1-5 Prediction	Whether it contains predictive content (e.g., future outcomes, achievement descriptions, etc.): 1 = yes, 0 = no.
Policy Aim (X2)	X2-1 Clarify Responsibilities	Whether it involves clarifying the responsibilities of various entities: 1 = yes, 0 = no.
	X2-2 Team Building	Whether it involves strengthening the construction of the disease control supervisor team: 1 = yes, 0 = no.
	X2-3 Capacity Enhancement	Whether it involves enhancing the capabilities of disease control supervisors: 1 = yes, 0 = no.
	X2-4 Outcome Innovation	Whether it involves innovation in pilot program outcomes: 1 = yes, 0 = no.
Policy Content (X3)	X3-1 Overall Requirements	Whether it specifies overall requirements: 1 = yes, 0 = no.
	X3-2 Pilot Scope	Whether it defines a clear pilot scope: 1 = yes, 0 = no.
	X3-3 Main Tasks	Whether it outlines main tasks: 1 = yes, 0 = no.
	X3-4 Timeline	Whether it provides a detailed timeline and implementation plan: 1 = yes, 0 = no.
	X3-5 Work Requirements	Whether it specifies concrete work requirements: 1 = yes, 0 = no.
Policy Object (X4)	X4-1 Health Commission	Whether it involves health commissions at various levels: 1 = yes, 0 = no.
	X4-2 Disease Control Bureau	Whether it involves disease control and prevention bureaus at various levels: 1 = yes, 0 = no.
	X4-3 TCM Administration	Whether it involves administration of traditional Chinese medicine at various levels: 1 = yes, 0 = no.

	X4-4 Health Inspection Institute	Whether it involves health inspection institutes at various levels: 1 = yes, 0 = no.
	X4-5 Medical Institutions	Whether it involves medical institutions: 1 = yes, 0 = no.
	X4-6 Center for Disease Control and Prevention	Whether it involves disease control and prevention centers: 1 = yes, 0 = no.
	X4-7 Disease Control Supervisor	Whether it involves disease control supervisors: 1 = yes, 0 = no.
	X5-1 Coordination	Whether it involves the need for coordination: 1 = yes, 0 = no.
	X5-2 Division of Labor and Collaboration	Whether it involves multi-departmental division of labor and collaboration: 1 = yes, 0 = no.
Policy Safeguard	X5-3 Evaluation and Monitoring	Whether it involves evaluation and monitoring: 1 = yes, 0 = no.
(X5)	X5-4 Experience Summary	Whether it requires summarizing experiences: 1 = yes, 0 = no.
	X5-5 Promotion and Application	Whether it requires promotion and application: 1 = yes, 0 = no.
	X5-6 Publicity and Reporting	Whether it involves publicity and reporting: 1 = yes, 0 = no.
	X6-1 Mechanism Optimization	Whether it involves optimizing the management mechanism for disease control supervisors: 1 = yes, 0 = no.
Policy Function	X6-2 Strengthened Assessment	Whether it involves strengthening the assessment of disease control supervisors and related units: 1 = yes, 0 = no.
(X6)	X6-3 Effectiveness Enhancement	Whether it involves consolidating and enhancing the effectiveness of disease control supervisors' work: 1 = yes, 0 = no.
	X6-4 Mechanism Improvement	Whether it involves improving mechanisms related to disease control supervision: 1 = yes, 0 = no.
	X7-1 Coordination of Personnel Sources	Whether it coordinates personnel sources: 1 = yes, 0 = no.
	X7-2 Standardization of Work Responsibilities	Whether it standardizes work responsibilities: 1 = yes, 0 = no.
Policy Tool	X7-3 Clarification of Qualification Requirements	Whether it clarifies qualification requirements: 1 = yes, 0 = no.
(X7)	X7-4 Strengthened Training and Assessment	Whether it strengthens training and assessment: 1 = yes, 0 = no.
	X7-5 Coordination of Deployment Methods	Whether it coordinates deployment methods: 1 = yes, 0 = no.
	X7-6 Reinforcement of Responsible Entities	Whether it reinforces responsible entities: 1 = yes, 0 = no.
	X8-1 Effectiveness Tracking	Whether it involves monitoring and evaluation content, establishing an assessment system: 1 = yes, 0 = no.
Policy Constraint	X8-2 Information Sharing	Whether it involves information sharing: 1 = yes, 0 = no.
(X8)	X8-3 Disciplinary Mechanism	Whether it involves disciplinary mechanisms for policy and its implementation: 1 = yes, 0 = no.
	X8-4 Incentive Mechanism	Whether it involves incentive mechanisms for policy and its implementation: 1 = yes, 0 = no.
Policy Evaluation	X9-1 Clear Objectives	Whether the objectives are clear: 1 = yes, 0 = no.
(X9)	X9-2 Adequate Basis	Whether the basis is adequate: 1 = yes, 0 = no.

X9-3 Detailed Content	Whether the content is detailed: 1 = yes, 0 = no.
X9-4 Clear Rights and Responsibilities	Whether the rights and responsibilities are clear: 1 = yes, 0 = no.
X9-5 Scientific Plan	Whether the attached plan is scientific: 1 = yes, 0 = no.

Table 3 Variable structure of the multi-input-output table.

Primary Variable	Secondary Variable						
X_1	X_{1-1}	X_{1-2}	X_{1-3}	X_{1-4}	X_{1-5}		
X_2	X_{2-1}	X_{2-2}	X_{2-3}	X_{2-4}			
X_3	X_{3-1}	X_{3-2}	X_{3-3}	X_{3-4}	X_{3-5}		
X_4	X_{4-1}	X_{4-2}	X_{4-3}	X_{4-4}	X_{4-5}	X_{4-6}	X_{4-7}
X_5	X_{5-1}	X_{5-2}	X_{5-3}	X_{5-4}	X_{5-5}	X_{5-6}	
X_6	X_{6-1}	X_{6-2}	X_{6-3}	X_{6-4}			
X_7	X_{7-1}	X_{7-2}	X_{7-3}	X_{7-4}	X_{7-5}	X_{7-6}	
X_8	X_{8-1}	X_{8-2}	X_{8-3}	X_{8-4}			
X_9	X_{9-1}	X_{9-2}	X_{9-3}	X_{9-4}	X_{9-5}		

Table 4 Multi-input-output matrix of the 24 policy texts.

Primary Variable	Secondary Variable	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24
X1	X1-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	X1-2	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	1	0	1	1	0	1	0	1	1
	X1-3	1	0	0	1	1	1	0	1	0	1	0	1	0	1	0	1	1	0	1	0	1	1	1	0
	X1-4	0	1	1	1	1	1	1	0	1	0	1	1	0	1	1	0	1	1	1	1	1	1	0	0
	X1-5	1	0	1	0	1	0	0	0	0	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1
X2	X2-1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	1	1	1	0	1	1	1	0	0	1
	X2-2	0	1	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0
	X2-3	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	X2-4	0	0	1	0	0	1	1	0	0	0	0	0	0	0	1	0	0	1	1	1	1	0	1	1
X3	X3-1	1	1	1	0	0	1	1	0	0	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1
	X3-2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1
	X3-3	1	1	1	0	1	1	1	0	0	1	1	0	0	1	1	1	1	1	1	1	1	1	0	0
	X3-4	0	0	1	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1
	X3-5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
X4	X4-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	X4-2	1	1	1	1	0	1	0	0	1	1	0	1	0	0	0	1	0	0	1	0	0	0	0	0
	X4-3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	X4-4	1	1	1	1	1	0	0	1	1	1	0	0	0	1	0	1	0	0	0	0	1	0	0	1
	X4-5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	X4-6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	X4-7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
X5	X5-1	1	1	1	1	1	1	0	0	1	1	1	0	1	1	0	1	0	0	0	1	0	1	1	1
	X5-2	0	1	0	1	1	1	1	1	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0
	X5-3	1	1	1	1	1	1	0	1	1	0	0	1	1	0	1	0	0	1	0	0	1	1	1	0
	X5-4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	X5-5	0	0	1	0	0	1	1	0	1	1	1	1	0	1	1	1	1	1	1	0	1	0	1	1
	X5-6	0	0	1	0	0	1	1	0	0	1	0	0	1	0	1	1	1	1	1	1	1	0	0	0
X6	X6-1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	1	0	0	1	1	1
	X6-2	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	1
	X6-3	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	0
	X6-4	1	1	0	1	0	1	1	0	0	1	0	0	1	0	0	0	1	1	1	1	0	1	1	1
X7	X7-1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1
	X7-2	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	X7-3	0	1	1	1	1	1	1	0	0	1	0	0	0	1	1	1	1	1	1	1	1	0	1	1
	X7-4	1	1	1	1	1	1	1	0	0	0	1	1	1	0	1	0	1	1	1	1	1	0	1	1
	X7-5	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1
	X7-6	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1
X8	X8-1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1
	X8-2	1	1	1	1	0	0	1	1	0	1	1	1	0	0	1	1	1	0	1	1	1	1	1	1
	X8-3	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0
	X8-4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
X9	X9-1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	X9-2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	X9-3	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
	X9-4	0	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1
	X9-5	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	0	1	0	0	0	0	0

Table 5: Calculation of PMC Index.

Code	x1	x2	x3	x4	x5	x6	x7	x8	x9	PMC-Index	Ranking
P1	0.80	0.50	0.60	0.86	0.50	0.75	0.67	0.75	0.80	6.22	15
P2	0.60	0.75	0.80	1.00	0.67	1.00	1.00	1.00	1.00	7.82	1
P3	0.80	0.75	1.00	1.00	0.83	0.50	1.00	0.75	1.00	7.63	2
P4	0.80	0.75	0.60	0.86	0.67	0.75	1.00	0.75	0.80	6.97	6
P5	1.00	0.50	0.80	0.71	0.67	0.75	1.00	0.50	1.00	6.93	7
P6	0.80	0.75	1.00	0.71	1.00	0.75	0.83	0.50	0.80	7.15	3
P7	0.60	0.75	0.80	0.57	0.67	0.75	0.83	0.75	0.80	6.52	11
P8	0.60	0.50	0.40	0.71	0.50	0.50	0.50	0.75	0.80	5.26	21
P9	0.40	0.25	0.60	0.86	0.67	0.50	0.67	0.50	0.60	5.04	24
P10	0.80	0.25	0.80	0.86	0.67	0.75	0.67	1.00	0.80	6.59	10
P11	0.80	0.50	0.80	0.57	0.67	0.50	0.33	0.75	0.60	5.52	19
P12	0.60	0.25	0.80	0.71	0.50	0.50	0.83	0.75	0.60	5.55	18
P13	0.60	0.50	0.60	0.57	0.67	0.50	0.83	0.50	0.40	5.17	22
P14	0.80	0.50	0.80	0.71	0.50	0.25	0.83	0.50	0.60	5.50	20
P15	0.80	0.75	1.00	0.57	0.67	0.50	1.00	0.50	0.60	6.39	14
P16	0.80	0.50	0.80	0.86	0.67	0.50	0.83	0.75	1.00	6.71	9
P17	0.80	0.50	0.80	0.57	0.67	0.75	1.00	1.00	1.00	7.09	4
P18	0.80	0.50	1.00	0.57	0.67	0.50	0.67	0.50	0.60	5.81	17
P19	0.80	0.75	1.00	0.71	0.67	0.50	1.00	0.50	0.80	6.73	8
P20	0.60	0.75	1.00	0.57	0.50	0.50	1.00	1.00	0.60	6.52	11
P21	1.00	0.75	1.00	0.71	0.67	0.50	1.00	0.75	0.60	6.98	5
P22	0.60	0.50	0.60	0.57	0.50	0.75	0.50	0.75	0.40	5.17	22
P23	0.80	0.50	0.80	0.57	0.67	0.50	1.00	0.75	0.60	6.19	16
P24	0.60	0.75	0.80	0.71	0.50	0.75	1.00	0.75	0.60	6.46	13

Note: The PMC index of each policy is calculated from the unrounded variable scores derived from Table 4; displayed values are rounded to three decimal places, so minor differences of ±0.001 may occur if re-summed. Policies with identical PMC indices share the same rank (P7/P20 both rank 11; P13/P22 both rank 22).

Table 6 Policy classification standard based on PMC Index model.

PMC Index	**0~2.99**	**3~4.99**	**5~6.99**	**7~8.99**	**9~10.00**
Evaluation	Poor	Acceptable	Great	Excellent	Perfect

Note: The classification thresholds follow those used in prior PMC-based evaluations. The maximum possible PMC index under the present nine variable framework is 9, so the Perfect category (9–10.00) is reached only at exactly 9.

Figures

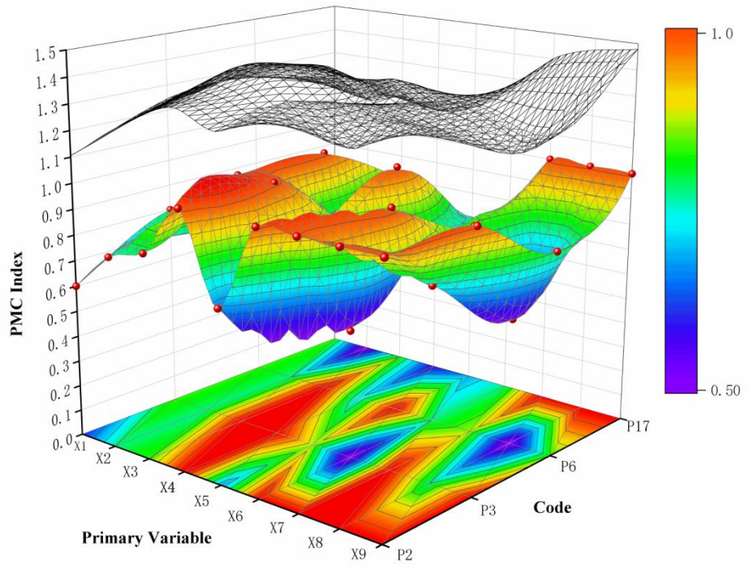


Fig. 1 Three-dimensional projection smooth matrix of the four Excellent disease control supervisor pilot policies (PMC index ≥ 7.0). Policies: P2 (Hebei Province), P3 (Guangxi Zhuang Autonomous Region), P6 (Nanning City), P17 (Baiyin District, Baiyin City).

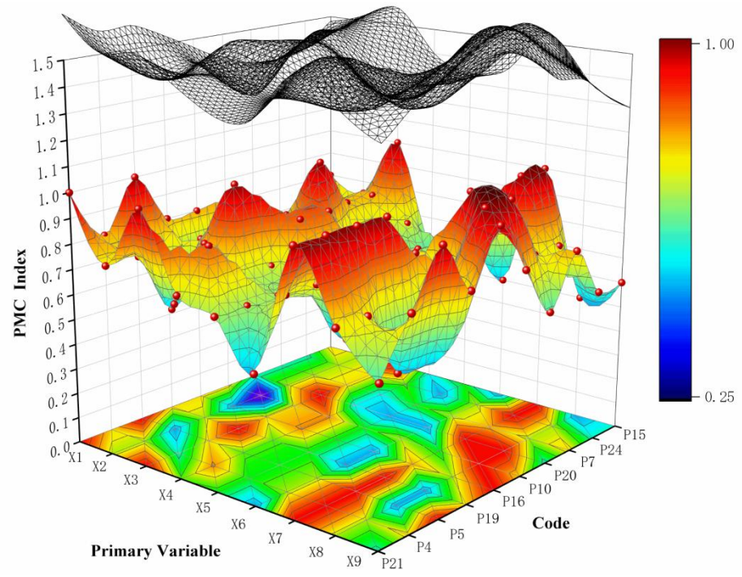


Fig. 2 Three-dimensional projection smooth matrix of the Great disease control supervisor pilot policies, panel a (PMC index 6.39–6.98, n = 10). Policies: P21, P4, P5, P19, P16, P10, P20, P7, P24, P15.

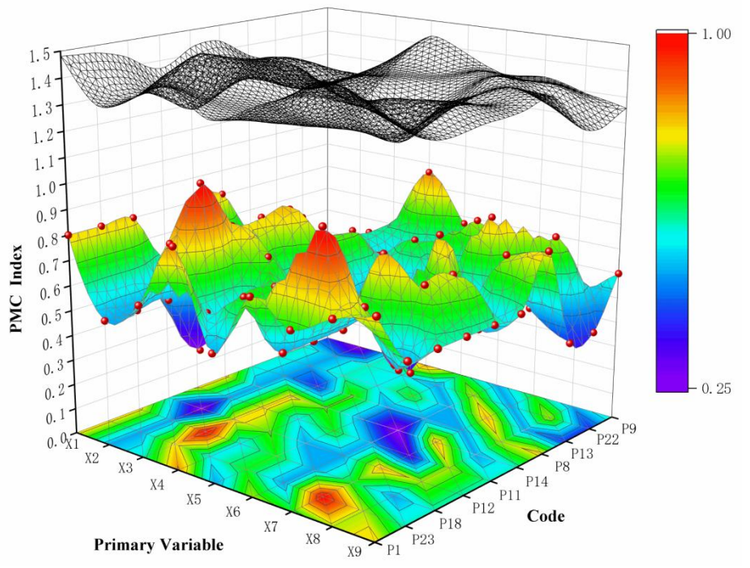


Fig. 3 Three-dimensional projection smooth matrix of the Great disease control supervisor pilot policies, panel b (PMC index 5.04–6.19, n = 10). Policies: P1, P23, P18, P12, P11, P14, P8, P13, P22, P9.

In each panel, the nine columns (X1–X9) denote the primary variables defined in Table 2; the policy axis lists individual policies in descending order of their PMC index; the vertical axis shows the normalized variable score; color indicates the normalized variable score; the black wireframe above the surface is its projection onto the top plane, shown for reference; values between measured points are interpolated for visualization only.

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