

Data integration in China's county-level medical communities: institutional dilemmas, generative mechanisms, and optimisation pathways from a holistic governance perspective

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Research Article

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Abstract

Background

The compact county-level medical community (CMC) is China's principal vehicle for building an integrated county health delivery system, and data integration is the core engine of its transition from "physical formation" to "chemical integration". Yet data sharing among CMC member institutions remains limited, and the barriers are widely treated as merely technical. This study explains why data fragmentation persists despite mature technology and increasingly mandatory policy.

Methods

We conducted a theory-guided policy analysis combined with a secondary analysis of national health statistics. Policy documents issued between 2017 and 2026 and indicators from the China Health Statistical Yearbook (2017–2024 editions) and annual national statistical bulletins were examined through an analytical framework that couples holistic governance theory with resource dependence theory across three dimensions: governance structure, governance mechanism, and governance capacity.

Results

National statistics reveal three structural constraints: a supply-demand mismatch (primary care institutions hold 17.8% of inpatient beds but deliver 51.8% of outpatient visits), polarised bed occupancy (91.1–97.5% in tertiary hospitals versus 50.2–57.5% in township health centres during 2019–2023), and a near five-fold gap in average inpatient expenditure per admission. These constraints map onto three mutually reinforcing dilemmas: managerial silos, interest silos, and technology silos. We conceptualise their common driver as "data powerization", a process whereby provider organisations convert patient data into bargaining chips, defensive risk barriers, and symbols of organisational independence, analogous to the "information blocking" described in other health systems. The three dilemmas constitute a circular lock-in: structural fragmentation distorts incentives, distorted incentives motivate data powerization, data powerization starves primary care of data and patients, and the resulting siphoning effect further entrenches fragmentation.

Conclusions

Data fragmentation in CMCs is fundamentally an institutional rather than a technological problem. Effective integration requires a sequenced pathway comprising payment reform as mechanism leverage, high-level coordination as structural guarantee, and cloud-based capacity building as the foundation, so as to reverse the cost-benefit logic of data hoarding and return health data to its status as public infrastructure.

Background

Building an integrated health delivery system has become a central task of health system reform in China and worldwide. The World Health Organization's Framework on Integrated, People-Centred Health Services calls on health systems to reorganise services around people's needs rather than around institutional boundaries [2], and integrated care has been shown to depend critically on the coordination and informational functions of primary care [3]. In China, the compact county-level medical community (CMC), in which a county-level hospital leads township health centres and village clinics under unified management, is the principal organisational vehicle for this agenda in rural areas and a core strategy for the national policy of strengthening primary care [1]. Within a CMC, the interconnection of health data is the foundation on which resource coordination, mutual recognition of examination results, two-way referral, and service continuity all depend. Data integration is therefore widely regarded as the core engine driving the CMC from "physical formation", the nominal combination of institutions, to "chemical integration", the genuine fusion of operations, incentives, and care pathways.

In practice, however, data fragmentation has become a prominent bottleneck constraining the effectiveness of CMCs. The "data silos" produced by incompatible information systems do more than impede the homogenisation of medical services; at a deeper level, they allow data to be converted into an asset in inter-institutional gaming [32]. Existing research on CMC informatisation has concentrated mainly on optimising technical architectures or on evaluating operational efficiency [4, 5], while relatively few studies have examined the institutional roots of data fragmentation from the perspective of governance power and interest gaming. Holistic governance theory, which seeks to overcome the fragmentation of public services through cross-sectoral and cross-level coordination, integration, and trust [6, 7], offers a suitable lens for this question. Yet the theory carries an implicit assumption that integration is inherently beneficial to all actors, an assumption that sits uneasily with the observation that hospitals frequently resist the very data-sharing arrangements that integration requires.

International experience suggests that this resistance is neither new nor uniquely Chinese. In the United States, the systematic refusal of providers and vendors to share electronic health information has been documented and named "information blocking", prompting federal legislation that now prohibits it [9]. The United Kingdom's National Health Service has repeatedly linked the success of integrated care to shared data infrastructure [25]. What these cases share with the Chinese county context is the finding that technological interconnection without compatible incentive structures tends to degenerate into empty platforms. What distinguishes the Chinese case is the depth to which data fragmentation is embedded in a fragmented administrative system of vertical and horizontal divisions and in institutionally independent accounting among providers that nominally belong to the same community.

Against this background, the present study pursues three objectives. First, it uses national health statistics to characterise the structural constraints under which data integration in CMCs operates. Second, drawing on resource dependence theory [8], it conceptualises and explains "data powerization", the

process by which medical institutions transform patient data into bargaining chips, defensive risk barriers, and symbols of organisational independence, and shows how three mutually reinforcing dilemmas lock data integration into a self-perpetuating equilibrium. Third, it derives a sequenced optimisation pathway from holistic governance theory and discusses its implications for health policy and for governance theory in the digital age.

Methods

Study design

This study is a theory-guided policy analysis combined with a secondary analysis of publicly available national health statistics. Rather than estimating the net effect of any single policy, it aims to construct an analytical account of why data integration in CMCs stalls and of the institutional conditions under which it can succeed. The study involved no human participants, no patient-level data, and no primary data collection; all data are aggregated national statistics and publicly issued policy documents.

Data sources

Three categories of material were analysed. First, policy documents on medical alliances, CMCs, and health informatisation issued by the State Council, the National Health Commission, and partner ministries between 2017 and 2026 were collected to trace the policy trajectory of data integration (Table 1). Second, aggregate indicators were extracted from the China Health Statistical Yearbook (2017–2024 editions) [10] and the annual Statistical Bulletin on China's Health Development [11], covering the distribution of outpatient visits and inpatient beds across institution levels, bed occupancy rates, average inpatient expenditure per admission, and hospital information infrastructure. Third, published accounts of reform practices in pioneering counties, notably the global budget payment reform in Tianchang, Anhui Province [27], and data governance initiatives in Deqing, Zhejiang Province, were used to illustrate the feasibility of the proposed pathways.

Table 1
Core national policies promoting data integration in China's county-level medical communities, 2017–2026

Year	Issuing authority	Policy document	Core guidance on data and informatization
2017	General Office of the State Council	Guiding Opinions on Promoting the Construction and Development of Medical Alliances	First proposal to explore information sharing within medical alliances and a telemedicine collaboration network
2019	National Health Commission and partner departments	Notice on Promoting the Construction of Compact County Medical Communities	Unified construction of information systems specified to achieve internal data interconnection; data integration upgraded from recommendation to requirement
2023	Ten departments jointly	Guiding Opinions on Comprehensively Promoting the Construction of Compact County Medical Communities	Cross-institutional mutual recognition of electronic medical records, laboratory tests, and imaging examinations through the national health information platform
2025	National Health Commission and partner departments	Functional Guidelines for Informatization of Compact County Medical Communities	Standardized informatization functions of medical communities; strengthened foundation for data sharing and business collaboration
2026	General Office of the State Council	Several Measures on Accelerating the Construction of the Hierarchical Diagnosis and Treatment System (Guo Ban Fa [2026] No. 11)	Integrated management of medical care, operations, and information within compact medical alliances; resource-sharing centres and data-supported referral management mandated
Policy documents were identified through a chronological review of documents issued by the State Council, the National Health Commission, and partner ministries between 2017 and 2026.			

Analytical framework

The analysis couples two theoretical lenses with clearly differentiated roles. Holistic governance theory [6, 7] serves as the prescriptive framework: its three mechanisms of coordination, integration, and trust indicate how fragmentation can be overcome. Resource dependence theory [8] serves as the diagnostic tool: it holds that organisational behaviour is constrained by dependence on critical external resources, and therefore explains why institutions rationally resist sharing when data constitutes a key resource. The two lenses are organised into a three-dimensional framework of governance structure (the macro distribution of authority and responsibility across departments and institutions), governance mechanism (the meso-level incentive arrangements, above all payment methods), and governance capacity (the micro-level informational and human capabilities of primary care institutions). Data integration is defined as the systematic process of standardising the collection and institutionalising the sharing of health data scattered across county-level institutions in order to support coordinated hierarchical diagnosis and treatment; its essence is an institutional arrangement concerning the ownership and benefit distribution of data rather than a mere technical project.

Analysis

Policy documents were analysed chronologically to identify shifts in the objectives and instruments of data integration policy. Statistical indicators were tabulated descriptively to identify structural imbalances between hospitals and primary care institutions. The statistical patterns and the institutional arrangements described in policy texts were then interpreted jointly through the analytical framework: each observed statistical pattern was mapped to a governance dilemma at the structural, mechanism, or capacity level, and the interactions among the three dilemmas were synthesised into a generative

model of data fragmentation (Fig. 1). Because the study relies on aggregate secondary data, no statistical inference was performed and no ethics approval was required.

Results

Policy trajectory: from institutional integration to data convergence

The policy evolution of CMCs has passed through three stages, moving from institutional establishment to system improvement and then to data empowerment (Table 1). In 2017, the General Office of the State Council issued the Guiding Opinions on Promoting the Construction and Development of Medical Alliances, which for the first time explicitly proposed exploring information sharing within medical alliances. In 2019, the National Health Commission launched pilot programmes for compact county medical communities, upgrading data integration from a soft recommendation to a hard requirement of unified information system construction. In 2023, ten departments jointly issued the Guiding Opinions on Comprehensively Promoting the Construction of Compact County Medical Communities (Guo Wei Ji Ceng Fa [2023] No. 41), proposing cross-institutional mutual recognition of electronic medical records, laboratory tests, and imaging examinations through the national health information platform. In 2025, the Functional Guidelines for Informatization of Compact County Medical Communities standardised the informatisation functions of CMCs, and in 2026 the General Office of the State Council issued Several Measures on Accelerating the Construction of the Hierarchical Diagnosis and Treatment System (Guo Ban Fa [2026] No. 11), which mandates the integrated management of medical care, operations, and information within compact medical alliances and reinforces resource-sharing centres and data-driven referral management. Data integration has thus fully entered a phase of standardisation and mandatory interconnection.

The resource landscape: three structural constraints

Effective data integration depends on the depth of business collaboration and the equalisation of information infrastructure. Descriptive analysis of the yearbook and bulletin data (Table 2) reveals three structural constraints that condition, and are partly produced by, the failure of data sharing.

Table 2
Key operational indicators of hospitals and primary care institutions in China, 2019–2023

Year	Share of outpatient visits, % (hospitals / primary care)	Share of inpatient beds, % (hospitals / primary care)	Bed occupancy rate, % (tertiary hospitals / township health centres)	Average inpatient expenditure per admission, CNY (hospitals / township health centres)
2019	44.0 / 51.9	78.0 / 18.5	97.5 / 57.5	9848.4 / 1986.5
2020	45.8 / 49.4	78.4 / 18.1	- / 53.6	10619.2 / 2085.4
2022	45.2 / 49.6	78.6 / 17.9	92.4 / 50.2	11706.2 / 2124.5
2023	44.6 / 51.8	78.7 / 17.8	91.1 / 53.3	10315.8 / 2175.6
CNY: Chinese yuan. In 2020, the COVID-19 pandemic caused anomalous fluctuations in hospital bed occupancy; the tertiary hospital value for that year is therefore omitted and marked as "-". Data for all other years use a consistent statistical calibre and are longitudinally comparable. Percentages may not sum to 100 because other institution types are not shown. Sources: China Health Statistical Yearbook [10] and Statistical Bulletin on China's Health Development [11].				

First, there is an extreme mismatch between the distribution of resources and the distribution of service demand, which entrenches technology silos at the grassroots. In 2023, hospitals accounted for 78.7% of inpatient beds nationwide while primary care institutions held only 17.8%; yet primary care institutions delivered 51.8% of outpatient visits, approximately 4.94 billion encounters [10, 11]. Less than one fifth of the beds thus bear more than half of first-contact consultations, leaving primary care institutions chronically overloaded. The hardware foundation of data sharing is correspondingly stratified: in 2023, tertiary hospitals operated an average of 640 CPU cores and 912 computer terminals per institution, against only 26 cores and 48 terminals in primary-level hospitals, gaps of roughly 25-fold and 19-fold respectively [10]. This hardware gap is consistent with the long-standing concentration of township health centres at the lowest levels (0–2) of the national Electronic Medical Record (EMR) Application Capability Grading Evaluation, which assesses little more than data collection within a single department [12]. Reaching level 3 or above, which requires cross-departmental data sharing and standardised data output, is practically unattainable at the grassroots given the dual shortage of hardware and of interdisciplinary talent [13, 14]. The binding constraint is not the purchase price of equipment but the fact that limited funds are absorbed by basic medical and public health services, leaving nothing for interface standardisation or for recruiting and retaining personnel competent in both clinical work and data governance.

Second, the polarisation of bed occupancy rates between institution levels reflects a siphoning-idling pattern sustained by the obstruction of two-way referral. Between 2019 and 2023, the bed occupancy rate of tertiary hospitals remained between 91.1% and 97.5%, while that of township health centres fluctuated between 50.2% and 57.5% (Table 2) [10, 11]. The coexistence of "one bed is hard to find" in large hospitals and empty beds at the grassroots directly signals the absence of cross-institutional data mutual recognition: without interoperable records, patients distrust grassroots facilities and prefer to occupy beds in tertiary hospitals rather than accept downward referral [15, 16]. Data barriers thereby function as a moat protecting the high occupancy and patient intake of large hospitals.

Third, the gap in average inpatient expenditure reveals the health economic driver of data hoarding. In 2023, average inpatient expenditure per admission was 10,315.8 Chinese yuan (CNY) in hospitals but only 2,175.6 CNY in township health centres, a difference of nearly five-fold (Table 2) [11]. Under the prevailing fee-for-service payment model, examination and test results completed at a county-level hospital represent direct marginal revenue; if such results were

shared with and reused by a township health centre, the county-level hospital would lose the corresponding fee income. This revenue gap converts medical data into a bargaining chip for defending institutional income and constitutes the economic core of resistance to data integration [17–19].

Three mutually reinforcing governance dilemmas

Fragmentation of governance structure: discrete authority, the siphoning effect, and managerial silos

At the macro level, the fragmented administrative system constitutes the fundamental institutional barrier to data integration. The health department manages service delivery, the medical insurance department controls payment, the finance department oversees funding, and the data management department coordinates infrastructure; no permanent body with sufficient authority exists to coordinate them, producing a classic policy subsystem coordination dilemma [23, 24]. This structural fragmentation directly consolidates the siphoning-idling pattern documented above. Within a CMC whose member institutions retain independent legal status and separate financial accounting, the leading hospital behaves as a rational economic actor: to preserve its bed occupancy and its monopoly position as the regional medical centre, it has no endogenous motivation to dismantle the data moat [15, 16]. Primary care institutions, lacking statutory data access rights and administrative leverage, can only passively accept informational exclusion. Blurred boundaries of authority and divergent organisational goals thus generate managerial silos that no technical interface can by itself remove.

Distortion of governance mechanisms: misaligned incentives, the cost gap, and interest silos

If structural fragmentation is the inherent deficiency of the system, distorted governance mechanisms are the acquired disorder that aggravates it. At the meso level, current payment arrangements lack any incentive-compatible design linking payment to data sharing, which directly breeds interest silos [17, 24]. This mechanism is the most direct expression of what we term data powerization. Under fee-for-service payment, a patient's data, above all laboratory and imaging results, equal the marginal revenue of the institution that produced them. Within this incentive structure, data powerization exhibits three layers of alienation, building from the inside out. The innermost layer is the risk barrier: in the absence of a robust mechanism for tracing responsibility for diagnostic quality, institutions fear liability for decisions made on shared data, and data become a defensive firewall; even where mutual recognition is technically feasible, institutions decline to share on grounds of uncontrollable data quality. The middle layer is the symbol of independence: under independent legal-person status, data are treated as a core marker of organisational autonomy, and sharing is perceived as a cession of organisational sovereignty. The outermost layer is the bargaining chip: facing the five-fold cost gap, institutions consciously withhold data because mutual recognition means surrendering revenue [18, 19]. These three layers progress from "dare not share" through "unwilling to share" to "unable to share", each reinforcing the others and together forming an institutional moat that is difficult to breach [32].

Weakness of governance capacity: the digital divide and technology silos

At the micro level, the backward information infrastructure and the shortage of digital talent in primary care institutions form the objective last-mile barrier [20, 21]. This technology silo is not simple technological lag but a survival-rational consequence of the supply-demand mismatch quantified above. Institutions that carry more than half of first-contact consultations on less than one fifth of bed resources must prioritise rigid expenditures on basic medical and public health services; they cannot spare funds for standardised data interfaces [21]. The roughly 25-fold hardware gap documented in Table 2 means that grassroots data collection cannot meet the basic requirements of cross-institutional exchange, and personnel proficient in both clinical operations and data governance are exceedingly scarce at this level. Hardware that cannot be afforded and talent that cannot be retained translate into soft resistance to data-sharing mandates, which then solidifies into technology silos.

The circular lock-in of the triple dilemma

The three dilemmas are not independent. They form a mutually reinforcing, self-perpetuating system of circular lock-in (Fig. 1). The dynamic chain runs as follows: structural fragmentation, in the form of absent cross-departmental coordination, permits mechanism distortion, under which fee-for-service payment makes data equivalent to revenue; mechanism distortion motivates data powerization, as institutions treat data as private assets; data powerization starves primary care of data empowerment and weakens its capacity to receive referred patients; weakened capacity drives upward patient siphoning, leaving township beds idle; siphoning entrenches the dominance of large hospitals, whose high occupancy further reduces their willingness to devolve data and authority; and entrenched dominance reproduces structural fragmentation. Within this closed loop, data powerization constitutes the optimal strategy of every actor under the given institutional constraints, and the three dilemmas generate a path dependence of "the harder data are to share, the less willing institutions are to share them". Breaking the deadlock therefore requires simultaneous intervention at the mechanism, structural, and capacity levels rather than further technological upgrading alone.

Discussion

Principal findings

This study set out to explain why data integration in China's county-level medical communities stalls despite mature technology and increasingly mandatory policy. Three findings emerge. First, national statistics reveal a coherent pattern of structural imbalance, a supply-demand mismatch, polarised bed occupancy, and a five-fold expenditure gap, that cannot be explained by technology alone. Second, these patterns are produced and reproduced by three governance dilemmas operating at the structural, mechanism, and capacity levels, whose common behavioural driver we have conceptualised as data

powerization. Third, the dilemmas form a circular lock-in, so that single-dimensional interventions are predictably ineffective. Together these findings reframe data fragmentation in CMCs as an institutional problem expressed through, rather than caused by, information systems.

Comparison with international experience

The Chinese pattern has close international analogues. In the United States, Adler-Milstein and Pfeifer documented how providers and health information technology vendors engage in "information blocking", the knowing interference with the exchange of electronic health information, and argued that the practice persists because it is economically rational for the actors involved; their recommended remedies centre on changing the economic and regulatory incentives rather than exhorting better behaviour [9]. Data powerization as conceptualised here is the Chinese institutional counterpart of information blocking: both describe the conversion of data control into organisational power, but the Chinese variant is more deeply embedded in independent legal-person status, fee-for-service payment, and territorial fiscal arrangements, and therefore less amenable to purely prohibitory regulation. The United Kingdom's experience similarly shows that integrated care depends on shared data infrastructure underwritten by system-level governance [25], and the wider integrated care literature confirms that informational integration fails without normative and functional integration beneath it [3]. China's additional difficulty lies in the fragmented administrative system of vertical and horizontal divisions, which means that the introduction of digital technology does not automatically dissolve bureaucratic fragmentation; it may instead be captured by existing interest structures and rebuilt as digital fences defending departmental barriers.

Policy implications: a sequenced three-dimensional pathway

The circular lock-in implies that reform must act on all three dimensions in a deliberate sequence of mechanism leverage, structural guarantee, and capacity foundation (Table 3). The first step is mechanism integration: reversing the cost-benefit calculus that sustains data powerization. The nationwide rollout of diagnosis-related group (DRG) and big-data diagnosis-intervention packet (DIP) payment converts examinations and tests from a profit centre into a cost centre, because excessive testing erodes the CMC's retained surplus under bundled payment; this reversal creates an endogenous motivation for cross-institutional mutual recognition of results [26]. Treating the CMC as a single payment entity under a global budget with surplus retention deepens this logic: the experience of Tianchang, Anhui Province, indicates that linking the per-capita prepayment of medical insurance funds to mandatory internal data interoperability shifts member institutions from zero-sum gaming to value co-creation [27]. Internal pricing of data contributions, piloted in Deqing, Zhejiang Province, through data contribution points that feed into performance distribution, offers an operational device for compensating institutions that supply high-quality shared data.

Table 3
A sequenced three-dimensional pathway for data integration in county-level medical communities

Step	Integration dimension	Dilemma addressed	Core governance instruments	Mechanism	Expected effect
Step 1: mechanism leverage	Governance mechanism	Mechanism distortion and interest silos (five-fold expenditure gap)	DRG/DIP bundled payment converting examinations into a cost centre; global budget with surplus retention and internal pricing of data contributions (Tianchang and Deqing practices)	Integration	Reverses cost-benefit expectations and dismantles the endogenous drive of data powerization
Step 2: structural guarantee	Governance structure	Structural fragmentation and managerial silos (siphoning effect)	High-level cross-departmental data governance task force for coordinated medical, insurance, and pharmaceutical governance; unified CMC management and a chief data officer system	Coordination	Reduces institutional transaction costs and removes the legal basis for data monopoly by individual institutions
Step 3: capacity foundation	Governance capacity	Capacity weakness and technology silos (supply-demand mismatch; 25-fold hardware gap)	County-level health data platform delivered as software as a service; shared diagnostic centres and clinical decision support; mutual recognition indicators embedded in performance assessment	Trust	Lowers the digital threshold of primary care and rebuilds trust in data sharing through scenario-based empowerment
DRG: diagnosis-related group; DIP: big-data diagnosis-intervention packet. The sequence follows the logic that mechanism reform creates the incentive, structural reform provides the authority, and capacity building consolidates the gains.					

The second step is structural integration: providing organisational legitimacy for the mechanism reform and cutting off the channels through which large hospitals exploit informational asymmetry. Data governance should be elevated to a county-level leadership project, with a cross-departmental data governance task force involving the health, medical insurance, finance, and data management departments to coordinate standards and mediate interest conflicts [28]. Vertically, the substantive unified management of administration, personnel, finance, operations, medicines, and information deprives individual institutions of the legal basis for treating data as private property, and a chief data officer or data governance committee within the CMC can clarify the rights to hold, process, and operate data resources [22, 29].

The third step is capacity integration: lowering the digital threshold of primary care through intensive construction rather than demanding heavy-asset investment from overloaded institutions. A county-level health data platform delivered to township health centres as a software service replaces the model in which each centre buys and maintains its own servers, guaranteeing uniform data standards while reducing the grassroots requirement to a terminal and a part-time administrator [30]. Shared diagnostic centres for imaging, electrocardiography, and pathology, in which primary care collects data and the county hospital issues mutually recognised reports, let primary care workers experience the benefits of data empowerment directly [31], and embedding clinical decision support into the platform creates a positive feedback loop of use and improvement. Finally, linking hard indicators such as the mutual recognition rate of examination results and the data continuity rate of two-way referrals to the annual salary of the CMC president and to departmental performance assessment provides the managerial discipline that carries reform through the last mile.

Theoretical implications

The findings invite a revision of holistic governance theory in the digital age. The theory's implicit premise that integration is inherently beneficial to all parties does not survive contact with a setting in which integration threatens the revenue and autonomy of dominant actors: digital interconnection without a prior reorganisation of governance power and interest distribution does not produce collaborative efficiency but consolidates and even amplifies existing fragmentation. The concept of data powerization names the mechanism of this capture and connects the Chinese experience to the international literature on information blocking [9], suggesting a general proposition for public governance research: in data-intensive sectors, the binding constraint on integration is the compatibility of incentive structures, not the maturity of technology. The ultimate goal of data integration, moreover, is not the physical aggregation of data but the creation of public value, concretised in the CMC context as improved health outcomes for county residents and the long-term sustainability of medical insurance funds; integrated payment anchors the interest networks of multiple actors to that public value goal and shifts the paradigm from passive defensive sharing to active value co-creation [2, 32].

Limitations and future research

This study has several limitations. It derives the generative mechanism of data fragmentation from policy analysis and aggregate national statistics; the micro-level gaming processes of data powerization, such as the interaction strategies of county hospital directors, information department heads, and primary care practitioners, await in-depth multi-case qualitative research. The proposed three-dimensional pathway is supported by illustrative local practices but has not been subjected to large-sample empirical evaluation. Future research could open the black box of medical data governance using evolutionary game models or actor-network theory, and could apply quasi-experimental designs such as difference-in-differences estimation to evaluate the net effect of coordinated medical, insurance, and pharmaceutical governance on data-sharing outcomes, thereby providing a firmer micro-level empirical foundation for holistic governance in the digital age.

Conclusions

Data fragmentation in county-level medical communities is not a symptom of technological backwardness but the concentrated expression of a fragmented governance model in digital space. This study has shown that, in the absence of benefit-compatible mechanisms, digital technology does not automatically integrate; it can be captured by bureaucratic and organisational interests and rebuilt as digital fences, a process we conceptualise as data powerization, in which patient data become bargaining chips, risk barriers, and symbols of institutional independence. The managerial, interest, and technology silos produced at the structural, mechanism, and capacity levels form a circular lock-in that single-dimensional reforms cannot break. Under the Healthy China strategy, the effective sequence is mechanism leverage, structural guarantee, and capacity foundation: integrated payment to reverse interest expectations, high-level cross-departmental coordination to reshape the distribution of authority, and scenario-based, cloud-delivered empowerment to close the grassroots capability gap. Only along this pathway can medical data be returned to their proper status as public infrastructure for population health rather than remaining chips in inter-institutional games, a conclusion with direct relevance for other health systems confronting information blocking in its various institutional forms.

Abbreviations

CDO
chief data officer
CMC
compact county-level medical community
CNY
Chinese yuan
DIP
big-data diagnosis-intervention packet
DRG
diagnosis-related group
EMR
electronic medical record.

Declarations

Ethics approval and consent to participate

Not applicable. This study is a policy analysis based exclusively on publicly available aggregate statistics and published policy documents; it involved no human participants, human data, or human tissue.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Authors' information

QS and FP are master's students, and XX is a professor and doctoral supervisor, at the School of Humanities and Management, Hunan University of Chinese Medicine, Changsha, China. QS's research focuses on health policy and medical community management.

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Author Contribution

Qianyue Su drafted the main manuscript. Fanyu Peng prepared Tables 1 and 2. Xinbin Xia was primarily responsible for manuscript review and revision. All authors read and approved the final manuscript.

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Data Availability

The statistical yearbooks, statistical daily reports and other data used in this paper are available for download on the official website of the National Health Commission of the People's Republic of China. For example, the 2024 statistical yearbook can be accessed at: https://www.nhc.gov.cn/mohwsbwstjxxzx/tjtjn/202601/4c453cf4278941ab8465846d1dc90e08.shtml[(https://link.wtturl.cn/?target=https%3A%2F%2Fwww.nhc.gov.cn%2Fmohwsbwstjxxzx%2Ftjtjn%2F202601%2F4c453cf4278941ab8465846d1dc90e08.shtml&scene=im&aid=582476)]

References

1. Zhang L, Yao KL, Xu CM. Research on service capacity improvement of central township health centers under the background of compact county medical community construction. *Health Econ Res.* 2025;42(9):62–6. (in Chinese).
2. World Health Organization. Framework on integrated, people-centred health services. Geneva: World Health Organization; 2016.
3. Valentijn PP, Schepman SM, Opheij W, Bruijnzeels MA. Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care. *Int J Integr Care.* 2013;13:e010.
4. Zhao MK, Ren SY, Song YM. Research on policy attention allocation of county medical community construction based on provincial-level policy texts. *Chin Hosp Manag.* 2025;45(12):22–6. (in Chinese).
5. Wang H, Zhang ZS, Xu XQ, et al. Study on operational efficiency and influencing factors of compact county medical community in Shandong Province: based on DEA-Malmquist and Tobit model. *Health Soft Sci.* 2026;40(1):1–6. 17. (in Chinese).
6. Jiang WX, Zhang DM, Zhang R, et al. Analysis of the current situation of informatization construction of county medical communities in China under holistic governance. *Chin Hosp Manag.* 2023;43(1):57–60. (in Chinese).
7. Perri 6. Holistic government. London: Demos; 1997.
8. Pfeffer J, Salancik GR. The external control of organizations: a resource dependence perspective. New York: Harper & Row; 1978.
9. Adler-Milstein J, Pfeifer E. Information blocking: is it occurring and what policy strategies can address it? *Milbank Q.* 2017;95(1):117–35.
10. National Health Commission of the People's Republic of China. China health statistical yearbook, 2017–2024 editions. Beijing: Peking Union Medical College; 2018–24. (in Chinese).
11. National Health Commission of the People's Republic of China. Statistical bulletin on China's health development, 2019–2023 editions. Beijing: National Health Commission; 2020–4. (in Chinese).
12. Yin XX, Ji GX, Yuan F. Discussion on current situation and development countermeasures of grassroots medical record information management. *Chin Med Rec.* 2024;25(5):4–5. 103. (in Chinese).
13. Wang YN, Chu YJ. Research on current situation analysis and optimization path of hierarchical diagnosis and treatment model in regional medical alliance. *Chin Rural Health Manag.* 2025;45(12):876–81. (in Chinese).

14. Yao XY, Dai RM, Luo L, et al. Research on application status and optimization strategies of electronic medical record system in Shanghai. *Chin Hosp Manag.* 2025;45(12):66–70. (in Chinese).
15. Wu WB, Su M. The realization path of hierarchical diagnosis and treatment in China from the perspective of holistic governance. *Inner Mongolia Soc Sci.* 2024;45(5):92–9. (in Chinese).
16. Dai TM, Yuan J, Dai KS, et al. Uneven evolution and driving mechanism of medical resource allocation: an empirical study based on SBM-Dagum model. *Health Econ Res.* 2025;42(9):48–52. 57. (in Chinese).
17. Shen X, Mao ZF, Xiao HJ et al. Holistic governance: synergistic development and governance of three medicals under the reform of medical insurance payment methods. *China Health Insur.* 2025;(5):13–9. (in Chinese).
18. He C, Yu QM. Research on the collaborative evolution of county medical community based on SFIC model. *Chin Hosp Manag.* 2025;45(12):27–30. (in Chinese).
19. Fu XY. Accelerating the standardization, structuring, and marketization of medical big data. *China Health.* 2025;(3):26–7. (in Chinese).
20. Zhang SH, Miao X. Exploration and thinking of digital technology in grassroots public health management services. *China Rural Health.* 2024;16(11):63–6. (in Chinese).
21. Yang J, Gong J, Liu B, et al. Current situation and development countermeasures of grassroots health informatization construction in Sichuan Province. *Health Econ Res.* 2024;41(6):90–3. (in Chinese).
22. Wang AL, Yang J, Yu SS, et al. Research on evaluation framework and optimization path of data management capability in medical institutions. *Chin J Health Inf Manag.* 2025;22(6):938–44. (in Chinese).
23. Gong X, Wang HB. Concept definition, development dilemmas, and path selection of multi-level medical security system from the perspective of holistic governance. *Chin J Health Policy.* 2024;17(2):1–8. (in Chinese).
24. Zhang LF, Zhang YC, Qin JM, et al. Development dilemmas, typical experiences, and relief strategies of rural medical and health system from the perspective of holistic governance. *Chin Health Econ.* 2026;45(1):65–9. (in Chinese).
25. NHS England. The NHS long term plan. London: NHS England; 2019.
26. Xiao HJ, Wan HH, Xiao HY, et al. The realization path of internal collaborative governance in tertiary public hospitals under the reform of DRG/DIP payment methods. *Chin Hosp Manag.* 2025;45(3):11–4. (in Chinese).
27. Zhu XL, Zheng Y, Wang QB, et al. Comparative analysis of the reform of medical alliance global budget payment system in some regions of China. *Chin Hosp Manag.* 2020;40(2):21–5. (in Chinese).
28. Hao Q, Zhang P, Mei SS, et al. Analysis of three medical collaborative development issues based on social network analysis. *Mod Hosp.* 2025;25(6):834–9. (in Chinese).
29. Lan CY, Cao L, Yang XL. Construction of hospital data governance system. *Chin J Health Inf Manag.* 2026;23(1):127–33. 160. (in Chinese).
30. Zhang XL, Ding XQ, Wang Y, et al. Design and practice of medical cloud platform based on Internet + Health. *Electron Compon Inf Technol.* 2022;6(2):179–81. (in Chinese).
31. Ma J, Yan RY, Tong ZW, et al. Construction and practice of regional ECG network platform based on hierarchical diagnosis and treatment system. *China Digit Med.* 2018;13(2):36–9. (in Chinese).
32. Peng JK, Huang R, Peng JX, et al. Research on health medical data sharing system under the framework of rule of law and ethics. *Health Econ Res.* 2024;41(4):47–50. (in Chinese).

Figures

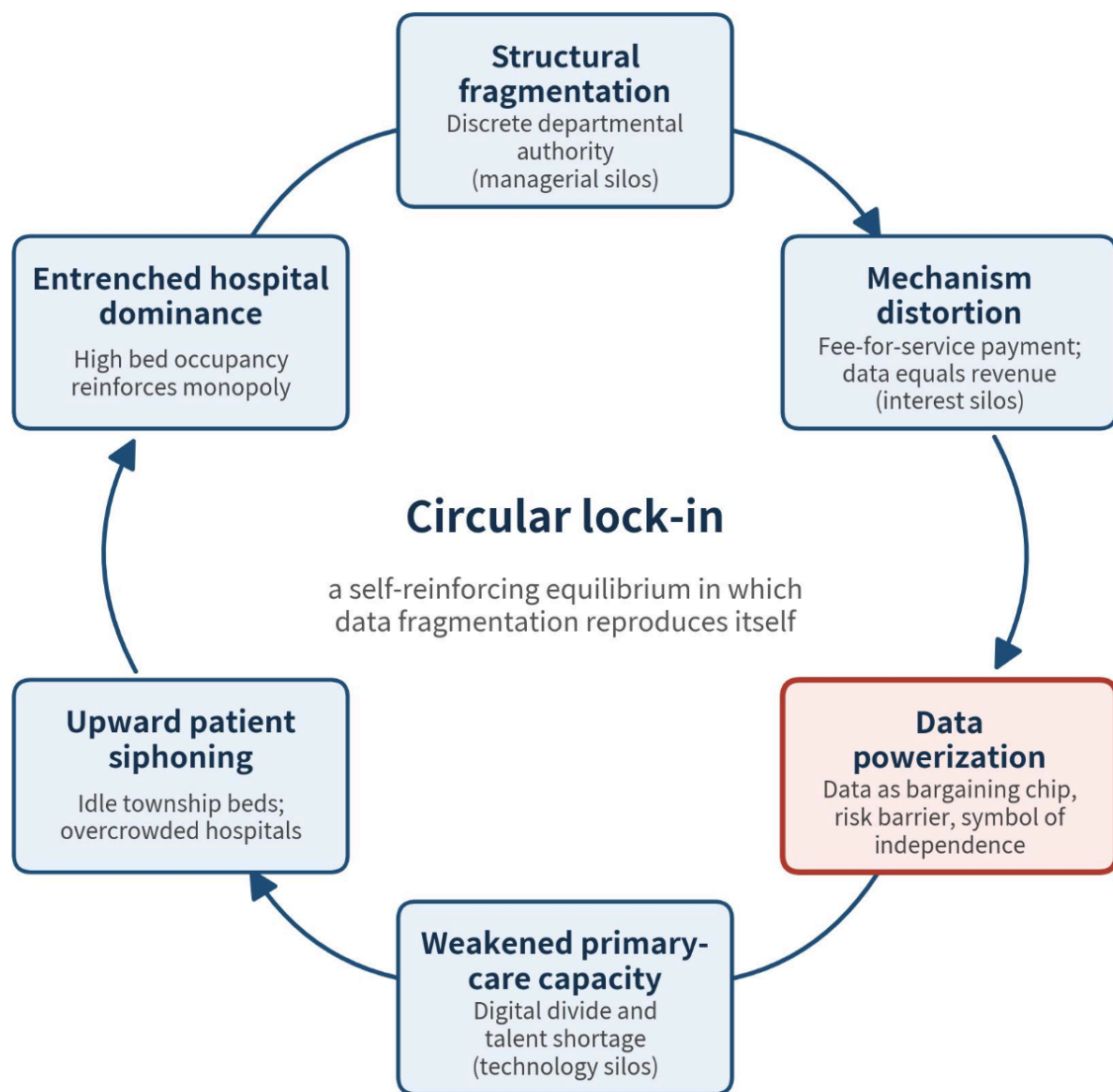


Figure 1

The circular lock-in mechanism of data integration in county-level medical communities. Structural fragmentation, mechanism distortion, and capacity weakness reinforce one another through data powerization (highlighted node), producing a self-perpetuating equilibrium in which data fragmentation reproduces itself. Arrows indicate the direction of the reinforcing cycle.

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