Quantitative Analysis of Chinese Chronic Disease Prevention and Control Policy Texts: A Three-Dimensional Framework Based on Policy Instruments, Policy Evolution, and Policy Actors (Postprint)

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Abstract

Background: China has increasingly emphasized chronic disease prevention and treatment, with a growing trend in both the quantity and variety of policies. As population aging intensifies, multimorbidity has emerged as a critical challenge in public health, necessitating the optimization of relevant policies. Objective: This study aims to reveal the characteristics and key focus areas of chronic disease policies, and to identify potential directions for policy improvement. Methods: Based on a three-dimensional framework encompassing policy instruments, policy evolution, and policy actors, content analysis was employed to encode and classify chronic disease-related policy documents issued from January 2009 to January 2024 using NVivo 20.0 software. Social network analysis and Ucinet 6.0 software were utilized to analyze the cooperation network among policy actors, while Excel 2021 was used for statistical analysis. Results: Analysis of 68 included policy documents identified 279 instances of policy instrument usage, comprising 135 supply-side instruments, 27 demand-side instruments, and 117 environment-side instruments. The General Office of the State Council accounted for the most policy instrument reference points (35.48%, 99/279), whereas the National People's Congress and its Standing Committee accounted for the fewest (2.87%, 8/279). Social network analysis revealed a policy actor cooperation network density of 0.631, with the National Health Commission exhibiting the highest centrality. Evolutionary analysis of the 68 policies demonstrated an increasing trend in both the quantity and variety of policy instruments over time; however, supply-side policy instruments remained predominant (35 documents), with limited involvement from the National People's Congress and its Standing Committee (3 documents). Furthermore, only

10 of the 68 policies specifically addressed multimorbidity. Conclusion: Structural imbalance exists in policy instrument utilization, and coordination among policy actors requires strengthening. Policies related to multimorbidity are limited in number and lack specialized, dedicated policies. To address challenges in chronic disease prevention and treatment, we recommend optimizing policy instrument allocation, enhancing synergistic effects among policy actors, and promoting the development of specialized multimorbidity policies to expand policy coverage. Additionally, a transition from a single-disease management model to a multimorbidity co-management model is needed to comprehensively enhance integrated chronic disease prevention and treatment capabilities.

Full Text

Quantitative Analysis of Chronic Disease Prevention and Treatment Policy Texts in China: A Three-Dimensional Framework Based on Policy Tools, Policy Evolution, and Policy Subjects

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Abstract

Background China is increasingly emphasizing the prevention and control of chronic diseases, with the number and variety of related policies showing a growing trend. With the intensification of population aging, multimorbidity has become a critical challenge in the field of public health, necessitating the urgent optimization of relevant policies. **Objective** This study aims to reveal the characteristics and priority areas of chronic disease policies and identify potential directions for policy improvement. **Methods** Based on a three-dimensional framework of policy tools, policy evolution, and policy actors, content analysis

was conducted using NVivo 20.0 software to encode and classify relevant policy documents issued between January 2009 and January 2024. Social network analysis was applied using Ucinet 6.0 software to examine the collaboration network among policy actors, and statistical analyses were performed using Excel 2021. **Results** Analysis of the 68 included policy documents identified a total of 279 references to policy tool usage, comprising 135 instances of supply-side tools, 27 instances of demand-side tools, and 117 instances of environmental tools. The General Office of the State Council accounted for the highest proportion of policy tool references (35.48%, 99/279), while the National People's Congress (NPC) and its Standing Committee accounted for the lowest (2.87%, 8/279). In the social network analysis, the collaboration network density among policy actors was 0.631, with the National Health Commission exhibiting the highest centrality. Further analysis of the 68 policies revealed an increasing trend in both the number and variety of policy tools as policies evolved, though supply-side tools remained predominant (35 policies). The NPC and its Standing Committee were involved in relatively few policies (3 policies). Moreover, only 10 out of the 68 policies addressed multimorbidity. **Conclusion** The results indicate structural imbalances in the use of policy tools and insufficient collaboration among policy actors. The number of policies addressing multimorbidity is limited, and specialized policies in this area are lacking. To address the challenges of chronic disease prevention and control, it is recommended to optimize the allocation of policy tools, enhance coordination among policy actors, and promote the development of specialized policies for multimorbidity. Expanding policy coverage and transitioning from a single-disease management model to an integrated multimorbidity management approach are essential to comprehensively strengthen the capacity for chronic disease prevention and control.

Keywords: Chronic diseases; Multimorbidity; Policy instruments; Social network analysis; Policy text analysis

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The "Healthy China 2030" Planning Outline explicitly proposes the implementation of a comprehensive chronic disease prevention and control strategy, highlighting China's high-level commitment to this critical public health issue. Notably, multimorbidity has emerged as a significant characteristic in the trajectory of chronic disease development. Multimorbidity refers to the simultaneous presence of two or more chronic conditions in an individual. As population aging intensifies, multimorbidity among older adults has become increasingly prevalent, evolving into a key challenge for public health. Globally, the prevalence of multimorbidity among individuals aged 65 and older ranges from 40% to 56%. In the field of health management, domestic research on multimorbidity in older adults in China has primarily focused on comprehensive assessment, disease management, and integrated medical and elderly care, with a notable absence of policy text analysis from the perspective of policy instruments. Policy instruments serve as an effective approach to studying public policy and

have been widely applied in the healthcare policy domain. This study first retrieved and analyzed chronic disease prevention and control policies, then specifically examined multimorbidity policies, conducting an in-depth analysis of 68 chronic disease prevention and control policy documents (including multimorbidity) based on a three-dimensional framework of policy instruments, policy evolution, and policy actors. The aim is to explore the characteristics, priority areas, and potential shortcomings of current chronic disease prevention and control policies in China, thereby providing feasible recommendations for policy improvement and optimization.

1.1 Data Sources

Using keywords such as "chronic disease," "comorbidity," "chronic illness," and "multimorbidity," we searched official websites of the State Council, the National Health Commission, the Ministry of Agriculture and Rural Affairs, the National People's Congress (NPC) and its Standing Committee, and the Peking University Law Database. Full-text fuzzy search was employed to retrieve relevant policy documents published between January 2009 and January 2024.

Inclusion criteria: (1) Policy documents issued by central government agencies; (2) Policies containing information related to chronic diseases; (3) Policy document types including laws, administrative regulations, State Council normative documents, and departmental rules. **Exclusion criteria:** (1) Policies with low relevance to chronic diseases; (2) Policy documents that mentioned keywords but lacked substantive content; (3) Documents such as leadership speeches and functional department reports. Based on these inclusion and exclusion criteria, 68 policy documents were ultimately selected, of which 10 addressed multimorbidity.

1.2 Research Methods

This study employed content analysis to examine chronic disease prevention and control policies in China. First, based on grounded theory, we compared and summarized the content of each policy text to construct a three-dimensional analytical framework of "policy instruments–policy evolution–policy actors." Next, using NVivo 20.0 software, we conducted cross-analysis across the three dimensions. Additionally, we utilized social network analysis with Ucinet 6.0 software to analyze the collaboration network among policy actors. Finally, Excel 2021 was used for three-dimensional statistical analysis.

1.3 Framework Construction

Policy formulation requires consideration of multiple factors, and traditional single- or two-dimensional analytical frameworks are inadequate for China's complex and dynamic policy environment and the reality of intertwined interests among multiple actors. Therefore, this study constructed a three-dimensional analytical framework for chronic disease prevention and control policies based

on policy instruments (X-axis), policy actors (Y-axis), and policy evolution (Z-axis) [Figure 1: see original paper].

X-axis: Policy Instruments. Policy instruments are the means or methods to achieve chronic disease prevention and control objectives. Adopting Rothwell's classification method and considering the characteristics of China's chronic disease prevention and control policies, we categorized the included policy content into supply-side, demand-side, and environmental types. Supply-side instruments primarily provide substantive support for chronic disease prevention and control, such as infrastructure development and workforce capacity building, to ensure stable operations. Demand-side instruments stimulate policy effectiveness through government and market roles; for example, the government reduces the medical burden on chronic disease patients by improving insurance coverage and expanding reimbursement categories, creating a pulling effect on policy implementation. Environmental instruments play an indirect facilitating role by establishing goal plans and legal regulations to create a social environment conducive to achieving policy objectives, promoting orderly and standardized development of chronic disease prevention and control efforts and improving their effectiveness.

Y-axis: Policy Actors. Policy actors refer to individuals, groups, or organizations involved in the policy process. This study employed social network analysis to construct a collaboration matrix among policy actors related to chronic disease prevention and control and analyze the collaboration network, focusing on network structural characteristics and node features to reveal the closeness of collaborative relationships among actors during policy formulation. Network centrality serves as a key indicator to measure the importance of network members and their position at the network's core. Chronic disease prevention and control involves multiple domains, requiring policies issued separately or jointly by different levels and functional departments. Therefore, studying the co-occurrence network of policy actors helps analyze collaborative relationships among policy-making entities, providing a reference for expanding the collaboration network in policy formulation and broadening policy coverage, thereby implementing the health policy principle of "integrating health into all policies."

Z-axis: Policy Evolution. Policy evolution is a continuous and dynamic process that clearly presents the development trajectory and changing trends of policies across different historical periods. As population aging deepens, living standards improve, and disease patterns shift, an increasing number of people suffer from multiple chronic diseases simultaneously. Multimorbidity management is more complex than single-disease management, necessitating policy evolution and updates to address new circumstances. Based on team discussions and taking the 2009 new medical reform as the starting point, chronic disease prevention and control policies were divided into four stages: reconstruction and exploration (2009–2012), deepening adjustment (2013–2016), maturation and improvement (2017–2020), and innovative development (2021–2024).

2.1 Policy Instrument Analysis Results

Quantitative analysis of the 68 included policy documents identified 279 instances of policy instrument usage, comprising 135 supply-side instruments, 27 demand-side instruments, and 117 environmental instruments. Detailed usage of each policy instrument type is shown in Table 1 .

First, there is an imbalance in the use of the three major policy instrument types. Overall, supply-side instruments accounted for 48.39% (135/279) of all policy instruments, highlighting policymakers' emphasis on supply-side tools in chronic disease prevention and control. Environmental instruments represented 41.93% (117/279) of usage, similar to supply-side instruments. In contrast, demand-side instruments showed notably low overall usage at only 9.68% (27/279), indicating considerable room for improvement in addressing the specific needs of chronic disease patients and stimulating policy effectiveness.

Second, imbalances also exist within sub-instruments. Among supply-side sub-instruments, basic public services, infrastructure development, and information technology accounted for relatively high proportions, while workforce development, financial investment, and resource allocation combined represented only 11.11% (15/135) of supply-side instruments, suggesting potential areas for development. Regarding demand-side instruments, medical insurance protection ranked highest in usage frequency, yet policies involving government procurement were rare (3.70%, 1/27). For environmental instruments, strategy and measures accounted for the highest proportion (35.90%, 42/117), followed by goal planning (19.66%, 23/117) and social environment (15.38%, 18/117), while fiscal and financial aspects were relatively weak (5.13%, 6/117).

2.1.1 Cross-Analysis of Policy Instruments and Actors

Using NVivo 20.0 software, we conducted cross-analysis between the X-axis (policy instruments) and Y-axis (policy actors) to reveal the relationship between chronic disease prevention and control policy instruments and actors, as shown in Figure 2 [Figure 2: see original paper]. Across the three policy instrument types—supply-side, demand-side, and environmental—the General Office of the State Council issued the most policy instrument references (35.48%, 99/279), with supply-side policies being the most frequent (46.46%, 46/99), followed by environmental policies (35.35%, 35/99), and demand-side policies the least (18.18%, 18/99). Additionally, the NPC and its Standing Committee issued the fewest documents (2.87%, 8/279), indicating greater potential for participation and impact in legislative and policy promotion aspects. Moreover, the NPC and its Standing Committee had zero references to demand-side policy instruments, suggesting that the role of demand-side policies needs strengthening, with further legislative focus required on improving public health awareness, enhancing healthcare service accessibility, and strengthening support mechanisms for chronic disease patients.

2.1.2 Cross-Analysis of Policy Instruments and Evolution

Figure 3 [Figure 3: see original paper] illustrates the distribution of the three policy instrument types across policy evolution stages. The results show that supply-side instruments had the highest proportion in each stage: 46.94%, 46.00%, 45.57%, and 55.17%, respectively, with their share gradually increasing over time. In contrast, the proportion of environmental instruments gradually declined after 2013–2016, decreasing from 46.00% to 36.78%. Demand-side instruments consistently accounted for the lowest proportion across all stages at 8.16%, 8.00%, 13.92%, and 8.05%, respectively.

2.2 Policy Actor Analysis Results

In the policy formulation system, policy actors serve as key players, and their hierarchical structure represents an important criterion for evaluating policy authority and implementation strength. Meanwhile, collaborative relationships among policy-making entities can reflect policy effectiveness to a certain extent and indicate expected implementation pathways. This study employed social network analysis to examine the network map of chronic disease prevention and control policy issuing entities. Among the 68 policy documents, only 3 originated from the NPC and its Standing Committee, while 53 came from the State Council and its subordinate agencies, accounting for 77.94% of the total. In terms of issuance patterns, 56 documents were issued independently (82.35% of the total), while only 12 were joint documents involving three or more departments (17.65%). Systematic analysis of the 68 policy documents revealed that over 80% were formulated by national-level decision-making bodies such as the NPC, the State Council, and their subordinate agencies. These documents carry significant authority within the policy system and can substantially represent national-level policy orientation and values.

The co-occurrence network of chronic disease prevention and control policy actors is shown in Figure 4 [Figure 4: see original paper]. The network density was calculated as 0.631, indicating that approximately 63.1% of policy actors established connections, collectively forming the overall network structure. In the figure, each blue node represents an independent policy actor, with larger central nodes indicating higher influence. Connecting lines between nodes represent collaborative relationships, particularly in jointly issuing policy documents. The eight relatively central entities are the National Administration of Traditional Chinese Medicine, the National Health Commission, the Ministry of Human Resources and Social Security, the National Development and Reform Commission, the Ministry of Science and Technology, the Ministry of Education, the Ministry of Finance, and the Ministry of Civil Affairs. These entities are interwoven across diverse policy documents and play pivotal roles in driving the construction of the chronic disease prevention and control policy system, reflecting their core positions in current policy formulation. Institutions such as the National Health Commission function as the “heart” of the policy promotion collaboration network, providing momentum and direction for the en-

tire system during policy formulation and playing advisory and executive roles that advance collaborative policy development. Various ministries serve as the "limbs" of the co-occurrence network, providing support and implementation during policy execution and refinement to ensure policies cover all domains and form a complete closed loop of actor collaboration. However, some policy actors exhibit clustering phenomena, such as the Ministry of Education, the Ministry of Human Resources and Social Security, and the National Health Commission, indicating that the policy issuance network has not fully formed a multi-center, decentralized collaboration pattern.

Node degree centrality refers to the number of direct connections between a network member and other members, which can be divided into absolute degree and normalized degree. Centrality share reflects the weight proportion of a node within the network; higher values indicate greater importance and attention received by chronic disease prevention and control policy actors within the overall network structure. We tallied the issuance frequency of institutions for the 68 policy documents and calculated each institution's centrality. The top-ranked actors are shown in Table 2 . The National Health Commission exhibited the highest centrality, reflecting its active role in policy formulation and effective collaboration with other departments. Although the National Development and Reform Commission had relatively low issuance frequency, its network centrality ranked second only to the National Health Commission, indicating frequent joint issuance activities with other actors and highlighting its important position in policy coordination.

2.3 Cross-Analysis Results Based on the Three Dimensions

Using the three-dimensional analytical framework, we conducted statistics on the 68 chronic disease prevention and control policy documents and created a three-dimensional cross-analysis chart (Figure 5 [Figure 5: see original paper]). The results show that environmental policies dominated during 2009–2012, accounting for two-thirds of policies in that stage. The period 2013–2016 showed balanced development across instrument types. During 2017–2020, supply-side and environmental policies were equal (8 documents each), while demand-side policies were only half as numerous. From 2021–2024, all three instrument types showed substantial growth. Over time, the leading role of the State Council and its General Office in chronic disease prevention and control gradually strengthened, increasing from 2 documents in 2009–2012 to 23 documents in 2021–2024, reflecting the state's continuously enhanced attention to and proactive action on the public health system. Across the four stages, environmental (25 documents) and demand-side (8 documents) policy documents remained relatively limited, indicating room for growth in environmental regulation and demand stimulation policies.

2.4 Multimorbidity Policy Analysis Results

China's policy formulation for multimorbidity began relatively late, with the first proposal to strengthen basic research on multimorbidity in older adults appearing in 2017. Subsequently, the 2019 "Healthy China Action" introduced the concept of integrated management of the "three highs" (hypertension, hyperglycemia, and hyperlipidemia), marking the formal launch of multimorbidity co-management practices across regions. However, China's current multimorbidity policy system remains weak, characterized by a limited number of relevant policies (only 10 documents) and a lack of specialized policies with clear targeting and comprehensive coverage (Table 3). This situation constrains policy effectiveness in guiding practice and optimizing resource allocation.

The prevalence of multimorbidity among residents in mainland China reaches 36.3%, with over 78% of older adults suffering from at least one chronic disease. As population aging progresses, multimorbidity not only imposes a heavy disease burden on patients but also creates challenges for the healthcare system in terms of service delivery and economic costs. Therefore, strengthening relevant policy guidance, improving multimorbidity monitoring, and establishing a systematic service model for multimorbidity co-management and co-governance are urgently needed.

Current chronic disease prevention and control policies have several gaps in the multimorbidity domain. First, there is a lack of specific implementation plans for multimorbidity co-management. Existing policies only propose "integrated management of the three highs," covering limited disease categories, with unclear co-management protocols and undefined responsible entities, requiring more targeted policies for concrete implementation. We recommend developing multimorbidity co-management policies covering multiple common chronic disease combinations, clarifying the respective responsibilities of government, medical institutions, communities, and patients in multimorbidity management, establishing cross-departmental collaboration mechanisms, and promoting effective policy implementation. Second, there is insufficient policy support for professional workforce development. The current process of building multimorbidity healthcare teams and talent cultivation lags behind, struggling to meet the growing demand for multimorbidity management. We recommend strengthening policy guidance on relevant discipline construction and personnel training, particularly for pharmacists and geriatric nursing staff. Third, there is an absence of policies addressing polypharmacy. Currently, 37% of adults over 65 experience polypharmacy, with 14% experiencing excessive polypharmacy, yet systematic guidance policies for polypharmacy remain blank, failing to provide clear operational guidelines for medical institutions and healthcare professionals. We recommend developing polypharmacy management guidelines tailored to China's older adult population and healthcare system, drawing on domestic and international advanced experiences to provide a scientific and systematic operational guide.

Overall, facing the increasingly severe challenge of multimorbidity, the formulation and adjustment of specialized multimorbidity policies are particularly critical. Policymakers need to shift their perspective from the traditional disease-centered "single-disease" management model to a more comprehensive, people-centered "multimorbidity co-management" model to comprehensively enhance chronic disease prevention and control capacity.

3 Discussion and Recommendations

Based on the three-dimensional framework of policy instruments, policy evolution, and policy actors, this study conducted an in-depth analysis of China's chronic disease prevention and control policies. As policies have evolved, they have shown trends toward diversification and comprehensiveness, yet issues remain, including structural imbalances in policy instruments, suboptimal collaboration among policy actors, and a lack of specialized multimorbidity policies. These deficiencies urgently require improved policy design to accelerate China's chronic disease prevention and control progress.

3.1 Optimize Policy Instrument Allocation to Improve Structural Balance

Policy analysis results show that policy instrument types are dominated by supply-side (48.39%) and environmental (41.93%) instruments, with demand-side instruments accounting for only 9.68%—a significant disparity indicating serious structural imbalance. Moreover, from an evolutionary perspective, the growth of demand-side instruments has been small and unstable. Future policy formulation should balance all instrument types, gradually increasing the proportion of demand-side policy instruments to fully leverage their pulling effect on chronic disease prevention and control. Specifically, this could involve policy guidance to strengthen medical insurance protection, expand reimbursement coverage, and reduce patient burden; providing policy support for international exchanges on chronic disease prevention and control to introduce advanced experiences and technologies; and conducting pilots on chronic disease management models and supervision mechanisms to explore effective experiences and develop replicable pathways. While supplementing demand-side instruments, optimization of supply-side and environmental instruments is also essential. For supply-side instruments, we recommend increased government investment in primary healthcare institutions, improved training quality for medical staff, and optimized allocation of medical equipment. For environmental instruments, we recommend strengthening health education and promotion activities and developing stricter health-related regulations and standards.

Additionally, imbalances exist within sub-instruments. Among current supply-side instruments, financial investment-related policy instruments are rarely used, which is detrimental to supporting the chronic disease medical insurance payment system and infrastructure development and indirectly affects the effective

functioning of demand-side instruments. We recommend that government departments increase financial investment to provide important momentum for chronic disease prevention and control. Among environmental instruments, the smallest sub-instrument is legal regulation (5.13%), and among policy actors, the NPC and its Standing Committee issued the fewest documents. Combined, these results suggest room for improvement in regulating medical services, perfecting supervision mechanisms, and protecting patient rights.

3.2 Strengthen Policy Actor Collaboration to Enhance Overall Effectiveness

Social network analysis reveals that in the current collaborative pattern, some policy actors exhibit clustering phenomena and have not fully developed a multicenter, decentralized collaboration model, resulting in limited overall cooperation that constrains policy formulation and implementation efficiency. To improve policy execution, collaboration among policy actors should be further promoted to develop more comprehensive policies, particularly through interdepartmental coordination and integration. We recommend establishing robust collaboration mechanisms and information sharing platforms to enhance synergistic effects and overall effectiveness in policy formulation, creating a prevention and control pattern with broad societal participation.

Among the included policies, independently issued documents accounted for a high proportion, while only 13 were joint documents, indicating that interaction and cooperation mechanisms among policy actors during policy formulation require optimization. Enhanced inter-agency coordination and integration are urgently needed to improve synergistic effects. Promoting cross-departmental collaboration is crucial for stimulating the potential of participating entities and leveraging departmental functions, significantly improving efficiency in policy formulation, implementation, and supervision, thereby maximizing resource utilization and policy benefits. Strengthening collaboration among policy actors helps build a more efficient and coordinated chronic disease prevention and control policy implementation system, providing strong support for achieving prevention and control objectives. We recommend that the government establish cross-departmental policy coordination mechanisms, such as regular policy coordination meetings and shared data platforms, to enhance communication and cooperation among policy actors. Simultaneously, attention should be paid to strengthening collaboration between government and non-governmental organizations, public hospitals, private institutions, and patient groups to form a chronic disease prevention and control pattern with broad societal participation.

3.3 Promote the Development of Specialized Multimorbidity Policies to Expand Coverage

Among the 68 policy texts included in this study, only 10 addressed multimorbidity, revealing insufficient policy coverage. Currently, national-level chronic disease prevention and control policies have emphasized health education, nu-

tritional guidance, integration of physical activity and medicine, and long-term care systems for chronic disease patients, but they have focused primarily on single diseases, with limited comprehensive and targeted policy guidance for multimorbidity.

Given the severe challenge of multimorbidity, the formulation and adjustment of specialized multimorbidity policies are particularly critical. Policymakers must shift from the traditional disease-centered "single-disease" management model to a more holistic, people-centered "multimorbidity co-management" approach to comprehensively enhance chronic disease prevention and control capacity.

Author Contributions: LONG Chunxiao was responsible for research conception and design, data collection, organization and analysis, and manuscript writing. LI Chenglu created figures and tables and contributed to manuscript writing. SHI Lei and FAN Yangdong were responsible for quality control and review, overall article responsibility, and supervision.

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Note: Figure translations are in progress. See original paper for figures.