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Applying the SFIC synergistic governance model to analyze determinants of multisectoral collaborative chronic disease management in Beijing's district H

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The prevalence of chronic diseases is influenced by multiple factors, making their management a complex social and multi-sectoral issue. China has implemented a multisectoral synergistic model for managing chronic diseases; however, enhancing its synergistic effectiveness remains necessary. This study aims to investigate the factors influencing multi-sectoral synergy in chronic disease management. We employed purposive sampling and multi-stage stratified sampling method to survey 160 personnel involved in chronic disease management across 10 departments of county-township-village three level in H District, Beijing. The SFIC (Starting Conditions, Facilitative Leadership, Institutional Design, and Collaborative Process) model served as the framework for the study, and structural equation modeling was conducted using AMOS 24.0 software to analyze the factors influencing the effectiveness of multisectoral collaboration in chronic disease management. The total effects of starting conditions, facilitative leadership, institutional design, and collaborative processes on the effectiveness of multi-sectoral collaboration in chronic disease management were 0.370, 0.638, 0.657, and 0.380, respectively. Among these factors, institutional design had the greatest impact on synergistic effectiveness (0.657). Additionally, the collaborative processes exhibited a mediating effect, contributing 0.525 to the total mediated effect. Starting conditions, facilitative leadership, institutional design, and collaborative processes all influence the effectiveness of multi-sectoral collaboration in chronic disease management, with the collaborative processes mediating these effects. Further efforts should focus on refining institutional design and facilitative leadership, while also considering the influence of the collaborative processes on synergistic effects.

Keywords SFIC model, Chronic disease management, Structural equation model, Multi-sectoral collaboration, Synergistic governance

Chronic non-communicable diseases ("chronic diseases") have become a major public health problem threatening human health worldwide. According to the latest information from WHO, chronic diseases cause about 41 million deaths annually, accounting for 71% of the total number of deaths worldwide[1]. According to WHO estimates, if measures are untaken, the total number of deaths from chronic diseases will rise to 55 million by 2030[2]. China has a grim picture of chronic disease, the prevalence of which has led to an increased disease and economic burden. Deaths due to chronic diseases have accounted for 88.5% of all deaths in the country in 2019, and the number of people with chronic diseases in China has exceeded 300 million, and the base of people with chronic diseases is still expanding[3].

In order to respond effectively to chronic diseases, the statement "Health in All Policies (HiAP)" was presented at the Eighth International Conference on Health Promotion, which proposes that countries formulate cross-sectoral public health policies, emphasizing the impact of public policies on health systems and on the determinants of health and well-being[4]. Many countries have developed national policies for the management

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and prevention of chronic diseases in order to improve care for patients with chronic diseases or to prevent chronic diseases[5]. For example, in the United States, chronic disease prevention services are legally included in medical insurance[6]. The North Karelia Project in Finland has been effective in preventing and controlling chronic diseases by implementing community-based interventions based on multisectoral cooperation[7]. Singapore has instituted group interventions that include community action, multisectoral collaboration, and policy formulation[8]. In addition, cross-sectoral public policies in countries such as Australia, Switzerland, the United Kingdom and others are playing an active role[9–11]. Since the launch of the new healthcare reform in 2009, more attention has been paid to the prevention and control of chronic diseases in China, and chronic disease management was included as a basic public health service program in the 2010 policy[12]. The Medium- and Long-Term Plan for the Prevention and Control of Chronic Diseases in China (2017–2025) in 2017 proposed to improve the comprehensive chronic disease prevention and control mechanism that is government-led, sectoral collaboration, mobilization of the society, and participation of the whole population, which has facilitated the formation of a comprehensive prevention and control work environment for chronic diseases[13].

As a common public health problem in China and around the world, the prevention and management of chronic diseases is a systematic project with cross-sectoral cooperation, which not only requires the collaboration of medical, preventive and insurance departments within the health system, but also the collaboration of other departments outside the health system[14–16]. Only through the formation of a multisectoral synergistic whole and effective synergistic mechanisms within and outside the health system in chronic disease management can we promote comprehensive chronic disease management.

It has become widely recognized that using intersectoral collaboration to address complex public health problems is an effective strategy. However, the effectiveness of multisectoral collaboration in chronic disease management is affected by many factors, such as common goals, political leadership, financial support, unclear responsibilities, and reward and punishment schemes[17–20]. However, relatively few empirical studies have explored how cross-sectoral collaboration can be fostered and sustained[21]. Although a multisectoral cooperation mechanism for chronic diseases has been established in China, the relationship between vertical and horizontal cooperation is not close enough, and the responsibilities and powers of each sector are not clear[22,23]. In addition, some non-health sectors are under-engaged[24]. Which elements of multisectoral collaboration in chronic disease management influence or facilitate multisectoral collaboration? For this problem, this study takes the SFIC synergistic governance model as the research framework, and constructs a framework for analyzing the factors influencing the multisectoral collaborative cooperation in chronic disease management through structural equation modeling, to explore how to promote and maintain cross-sectoral cooperation and tries to put forward some reference-value policy suggestions.

SFIC synergistic governance model

SFIC model is one of the classic synergistic governance models, which was proposed by American scholars Ansell and Gash in 2007[25]. Ansell and Gash adopted the "successive approximation analysis method" to fully analyze the general rules and particularities of 137 cases of synergistic governance in different countries and fields, breaking the limitation that traditional synergistic governance theory only studies a certain field[26]. After continuous argumentation, the factors affecting the effectiveness of synergistic governance were finally proposed, and the SFIC model, an analytical model of synergistic governance theory, was summarized and constructed[25]. The letters S, F, I, and C in the SFIC model refer to the four core factors that influence the effectiveness of synergistic governance in the synergistic governance process: Starting Conditions, Facilitative Leadership, Institutional Design, and Collaborative Process. The effect of synergistic governance is the outcome of a combination of starting conditions, facilitative leadership, institutional design, and collaborative process[27]. Starting conditions refer to the factors affecting the cooperation of the various stakeholders, including resource/knowledge/power inequality, motivation/constraints on participation, and history of cooperation or conflict among the subjects. Facilitative leadership refers to the empowerment of the various subjects in the collaborative process, which can ensure that the process is effectively synergized and plays an important role in the effectiveness of synergistic optimization. Institutional design refers to formulating clear rules and systems for the synergistic process, so that each subject has a clear charter for participating in synergistic governance. The synergistic process is an internal dynamic cyclical process under the combined effect of three variables: starting conditions, catalytic leadership, and institutional design, and it is a process in which trust is built up through face-to-face dialogues and inputs are made into the collaborative process, a consensus is reached, and stage-by-stage results are achieved among the various subjects[28]. The analytical framework of the SFIC model is shown in Fig. 1.

The SFIC model has been more frequently applied to the collaborative analysis of public governance in different scenarios. Stephen B used the theoretical framework to analyze the Seattle light rail project, arguing that infrastructure development requires multi-sectoral collaboration to build collaborative coalitions across organizations and sectors to formulate and implement public policies[29]. Todor et al. argue that the creation of collaborative network organizations can provide a long-term effective collaborative basis for proper governance and management, showing significant benefits in terms of sharing knowledge, resources and risks[30]. In addition, the SFIC model has been effectively used in public services[31] and blockchain governance[32], but has not yet been found to be used in the health field. In China, the SFIC model has been applied to some extent in the health field. Liu Ying et al. [33] argued that the synergy of multiple subjects in the sports-medical integration model is insufficient, and many institutions are still in the state of "doing things in their own way", so the SFIC model is used to analyze the reality of the dilemma of sports-medical integration in China. Yang Yusha et al. used SFIC as an analytical framework to comprehensively analyze the dilemma of synergistic cooperation among the various subjects of China's medical association, and on this basis put forward the path of synergistic governance of the medical association[34].

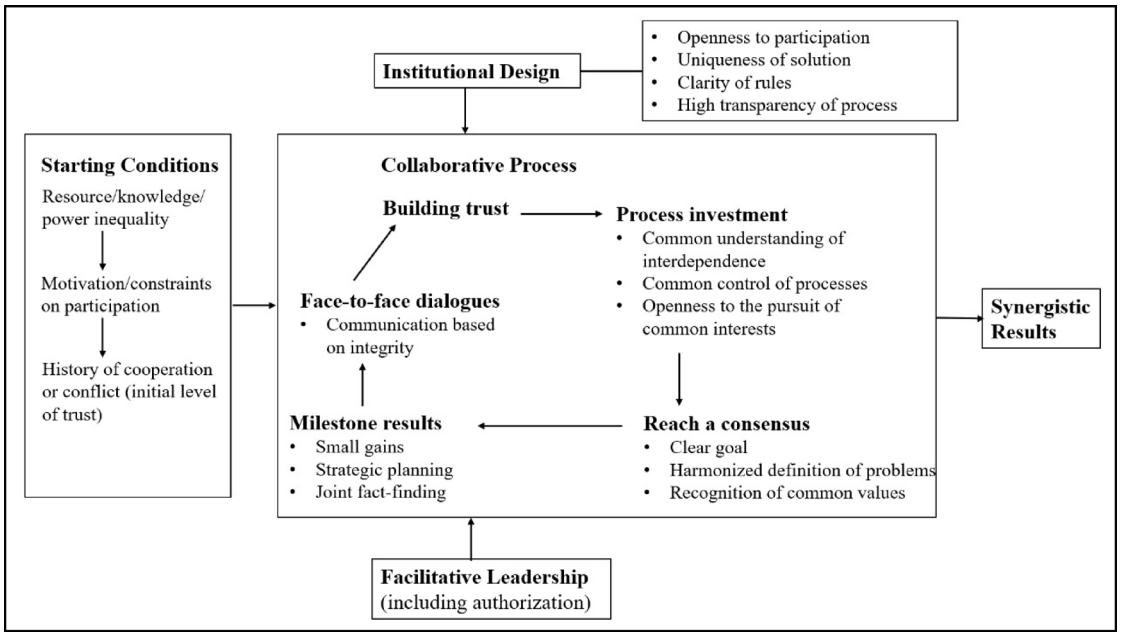

Fig. 1. Diagram of the analytical framework of the SFIC model.

Sector name	Category	Duties
Village committee	Non-health sector	Assist primary medical institutions in chronic disease management, etc
Village health office	Health sector	Carry out screening, intervention follow-up and health education for patients with chronic diseases, etc
Township government	Non-health sector	Organize, publicize and promote chronic disease management in the district, etc
Community health center	Health sector	Establish health records, implement daily management and health interventions for patients with chronic diseases, and guide village-level medical institutions in chronic disease management, etc
District hospital	Health sector	Carry out a clear diagnosis of the first visit of patients with chronic diseases, formulate individualized treatment plans, and provide operational training to doctors in primary medical institutions, etc
District center for disease and prevention and control	Health sector	Monitor chronic diseases and risk factors, promote appropriate technology for chronic diseases, etc
District medical insurance bureau	Health sector	Promote medical insurance payment reform, supervise outpatient medical insurance reimbursement for chronic diseases, etc
District community health center management center	Health sector	Organize, coordinate, supervise and assess chronic disease management in community health centers, etc
District health commission	Health sector	Organize chronic disease management as the lead sector, formulate chronic disease management programs, norms, etc
Patriotic health campaign committee	Non-health sector	Carry out environmental management, comprehensive health management, assist in the preventing and controlling of critical diseases, patriotic health promotion and universal health education, etc

Table 1. Duties of the sectors included in the study.

Materials and methods

Research scope

Chronic disease management involves internal synergy within the health system and internal and external synergy within the health system. In order to make the study more focused and feasible, the scope of collaborative chronic disease management was defined as internal collaboration within the "district-town-village" health system, and external collaboration within the "town-village" health system. The synergy within the health system is mainly the horizontal synergy of medicine, prevention and insurance, and the vertical synergy of "district-town-village" three-level medical institutions. The external synergy of the health system is mainly the synergy of government agencies at town and village levels and patriotic health campaign committees (Its main responsibilities are environmental governance, comprehensive health governance, assistance with key disease prevention and control and other public health work). The duties of each sector are shown in Table 1. The defined scope of this study is shown in Fig. 2.

Questionnaire design

We designed the questionnaire based on the four dimensions of the SFIC model and expert consultation. The questionnaire was divided into three parts: the first part was basic information about participants, the second part

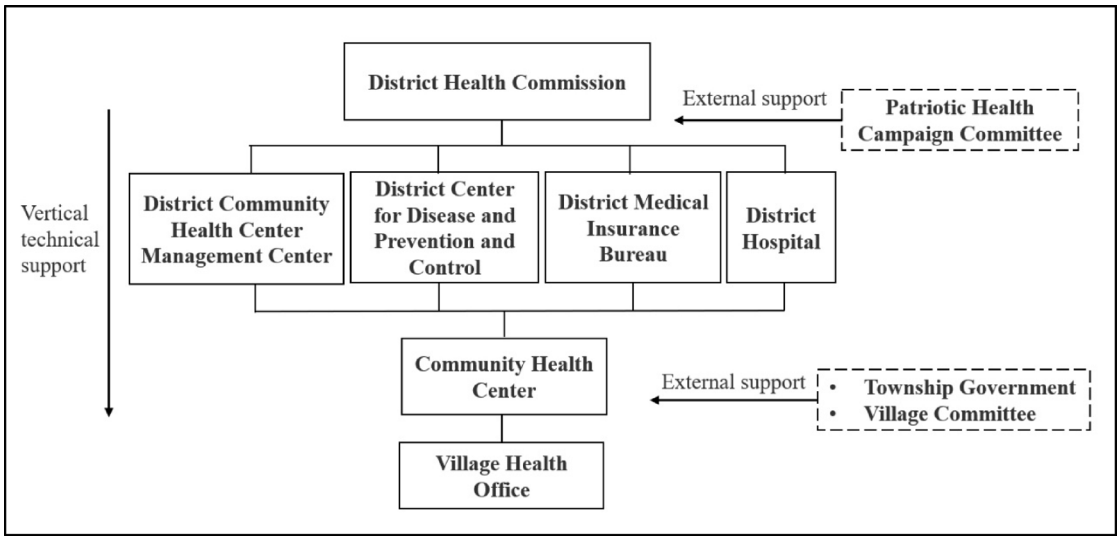

Fig. 2. Research scope definition framework diagram.

was the SFIC model scale for multisectoral collaborative management of chronic diseases, and the third part was the effect of synergy. The SFIC model scale for multisectoral collaborative management of chronic diseases has 19 items, with 4 items in the "Starting Conditions" dimension, 5 items in the "Facilitative Leadership" dimension, 5 items in the "Institutional Design" dimension, and 5 items in the "Collaborative Process" dimension. The synergistic effect has 4 items. All question item options in Part two and three were expressed on a five-point Likert scale, categorized into five levels from not agree at all to very agree, with scores of 1–5 assigned, which were used to quantify the survey respondents' subjective feelings about multisectoral collaborative management of chronic diseases.

Data sources

This study conducted a questionnaire survey in District H, Beijing. H District is one of the suburbs of Beijing, with mountainous areas accounting for 89% of the total area. At the end of 2021, there were 284 administrative villages and 36 communities, with a resident population of 441,000 in the district. Employing sampling method that included both purposive sampling and multi-stage stratified sampling. The questionnaire survey was conducted at the district level using the purposive sampling method, and 2–4 relevant personnel were respectively selected from the District Health Commission, District Community Health Center Management Center, District Center for Disease and Prevention and Control, District Medical Insurance Bureau, District Hospital and Patriotic Health Campaign Committee. A multi-stage stratified sampling method was used at the town and village levels. 6 towns were selected, and 1–2 relevant personnel from each town government and 8–10 medical personnel from each community health center were selected for the survey. In each town, 3 administrative villages were selected according to the geographical location and the level of economic development, and a total of 18 administrative villages were selected for questionnaire survey, and 1–2 persons from the village committee and 1 village doctor from the village health office were selected for survey in each village. 167 questionnaires were returned and 7 invalid questionnaires were excluded. Finally, a total of 160 valid questionnaires were included in the analysis with 95.81% validity rate. This study was conducted from September to October 2022.

Statistical analysis

First, we used frequency counts and percentages to characterize the basic characteristics of the respondents. Second, we calculated Pearson correlation coefficients to determine the associations among starting conditions, facilitative leadership, institutional design, and collaborative process. Finally, Structural Equation Modeling (SEM) was used to validate the path and integrated relationships among starting condition, facilitative leadership, institutional design, collaborative process, and synergistic effect. Maximum likelihood estimation was performed to estimate these parameters in SEM. Based on the N:q rule for SEM (sample size/parameter ≥ 5:1) and the academic experience that N = 100–150 is the minimum sample size for use of SEM[35,36]. In this study, the sample size of 160 and 19 parameters satisfy the requirements and the methodology is applicable. All statistical analyses were performed using SPSS 26.0 and AMOS 24.0. $P < 0.05$ was statistically significant.

Reliability and validity test

After designing the questionnaire, 18 respondents from the health sector and non-health sector were sought for pre-survey in August 2022 in District H to test the reliability and validity of the questionnaire. In this study, Cronbach's alpha coefficient was used to measure the reliability of the SFIC model scale for multisectoral collaborative management of chronic diseases. The measurement results showed that the overall Cronbach's alpha coefficient of the SFIC model scale was 0.855, and the Cronbach's alpha coefficients of the four dimensions were all greater than 0.7. Thus, it indicated that the reliability of the scale was good. See Table 2.

Dimension	Number of items	Cronbach's α coefficient
Total	19	0.855
Starting condition	4	0.860
Facilitative leadership	5	0.820
Institutional design	5	0.961
Collaborative process	5	0.961

Table 2. Reliability analysis of SFIC model scales overall and by dimension.

Name	Types	Value
Bartlett's test of sphericity	KMO value	0.934
	χ^2	3967.558
	P	< 0.001

Table 3. Bartlett's test of sphericity for SFIC model scale.

Dimension	Items	Standard load factor	*P*	Average variance extracted (AVE)	Combined reliability (CR)
Starting conditions	SC1	0.816	–	0.617	0.865
	SC2	0.808	< 0.001		
	SC3	0.769	< 0.001		
	SC4	0.829	< 0.001		
Facilitative leadership	FL1	0.844	–	0. 547	0.855
	FL2	0.853	< 0.001		
	FL3	0.755	< 0.001		
	FL4	0.756	< 0.001		
	FL5	0.644	< 0.001		
Institutional design	ID1	0.927	–	0.835	0.962
	ID2	0.973	< 0.001		
	ID3	0.944	< 0.001		
	ID4	0.895	< 0.001		
	ID5	0.823	< 0.001		
Collaborative process	CP1	0.910	–	0.828	0.960
	CP2	0.989	< 0.001		
	CP3	0.862	< 0.001		
	CP4	0.995	< 0.001		
	CP5	0.776	< 0.001		

Table 4. Convergent validity measures for the four dimensions of the scale.

The questionnaire designed in this study is based on the four core elements of SFIC, which was tested by KMO and Bartlett's spherical test, and the results showed that the KMO = 0.934 (> 0.8) and $\chi^2 = 3967.558 (P < 0.001)$. This indicates that this scale is ready to be used for validated factor analysis. See Table 3.

Validity tests require the calculation of convergent and discriminant validity, and we used Amos to conduct a validated factor analysis and measure the relevant indicators. According to the validation criteria, the factor standardized loading coefficients for each item in the scale were greater than 0.7 and $P < 0.05$, indicating a strong correlation between the item and the dimension. When AVE > 0.5 and CR > 0.7, the scale has high convergent validity. As shown in Table 4, all the four dimensions had AVE > 0.5 and CR > 0.7, and the results indicated that the scale had good convergent validity. However, the factor standardized loading coefficient for item CH5 was less than 0.7, and item CH5 was deleted before proceeding to the next step in the analysis.

Discriminant validity needs to be discriminated by the correlation coefficient and AVE square root value. As shown in Table 5, the diagonal of the table is the AVE square root value and the rest of the values are the correlation coefficients, if the AVE square root value of a factor is greater than the absolute value of correlation coefficients between that factor and the other factors and all the factors present this result, the scale has a good discriminant validity. According to the discriminant criteria of discriminant validity, this scale has good discriminant validity among all four dimensions.

Based on the results of the above analysis, the scales of this study have good reliability and validity for further analysis.

	Starting condition	Facilitative leadership	Institutional design	Collaborative process
Starting condition	0.785			
Facilitative leadership	0.708	0.769		
Institutional design	0.641	0.740	0.943	
Collaborative process	0.606	0.755	0.914	0.910

Table 5. Distinguishing validity measures for the four dimensions of the scale.

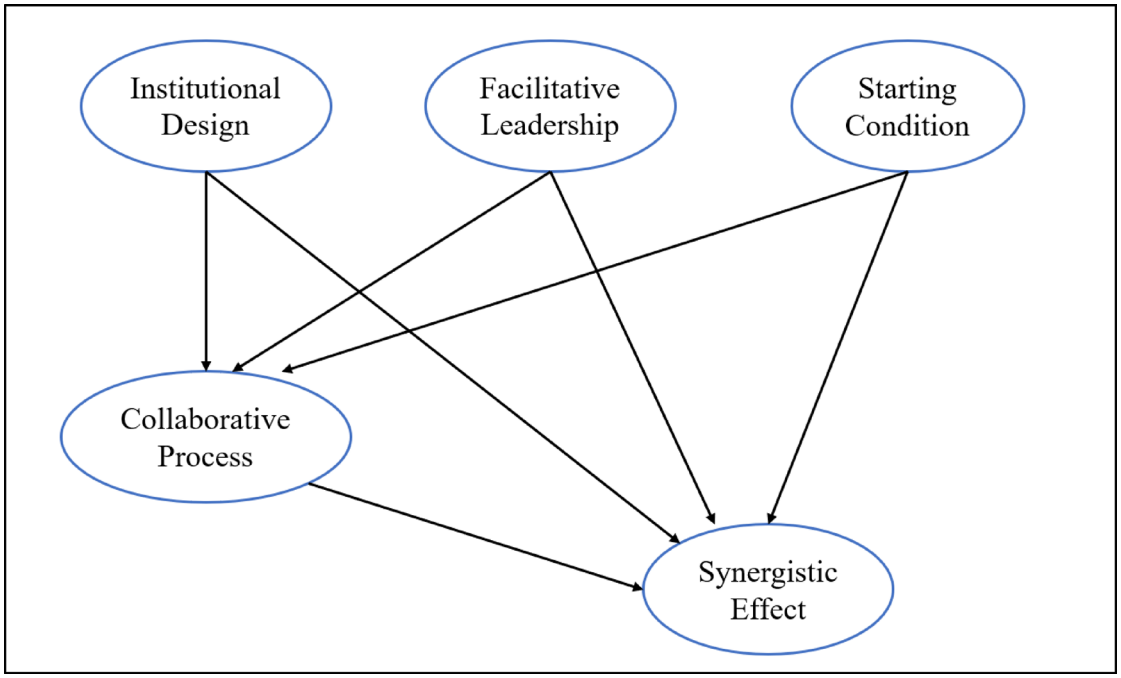

Fig. 3. Initial model of the multisectoral collaborative management pathway for chronic diseases.

Results

Based on the SFIC model and study hypotheses, an initial model of multisectoral synergistic management of chronic diseases was constructed. Starting condition, facilitative leadership, and institutional design were used as exogenous latent variables, collaborative process as a mediating variable, and synergistic effect of multisectoral management of chronic diseases as an endogenous latent variable. The initial model is shown in Fig. 3.

From the results of the fitness test of the initial model, the values of GFI, AGFI, RMSEA, NFI and TLI in the fitness index did not meet the evaluation criteria. In general, the fitness of the initial model is not high, so the model needs to be corrected according to the correction index. The model is theoretically supported by the SFIC synergistic governance theory, and the relationship among the potential variables is set according to the SFIC model, which has a certain theoretical basis. Thus only correction of the observed variables, latent variables, and error terms with respect to each other based on the MI values in the structural equation modeling is required. According to the correction coefficients of the model, six observed variables were deleted, seven correlations between error terms were added, and the model finally met the fitness criteria in all cases. As shown in Table 6.

The path coefficients between each latent variable were tested to be statistically significant. From the results of the impact effect analysis, the starting condition, facilitative leadership, and institutional design have a direct impact on the collaborative process, and a direct and indirect impact on the synergistic effect; the collaborative process has a direct impact on the synergistic effect. Institutional design had the greatest impact on synergistic effect (0.657), followed by facilitative leadership (0.638), and starting condition had the least impact (0.370). The collaborative process had the highest mediating effect value (0.281) between institutional design and synergistic effect, and the collaborative process had the lowest mediating effect value (0.091) between starting condition and synergistic effect, and the collaborative process had a total mediating effect value of 0.525, which accounted for 31.53% of the total effect of starting condition, facilitative leadership, institutional design and synergistic effect. As shown in Tables 7 and 8.

Discussion

Multisectoral collaboration is necessary to address the social determinants of health for chronic diseases, as the implementation of complex multilevel evidence-based health policies, environmental interventions, etc[37]. At

Fitness indicators	Fitness standard	Initial model	Modified model
NC	1 < NC < 3 Model have a degree of parsimony fit; NC > 5 Model needs to be corrected	4.565	1.774
GFI	> 0.9 Good; > 0.85 Acceptable	0.649	0.905
AGFI	> 0.9 Good; > 0.85 Acceptable	0.553	0.851
RMSEA	< 0.05 Good; < 0.08 Acceptable	0.147	0.068
NFI	> 0.9 Good; > 0.85 Acceptable	0.834	0.958
CFI	> 0.9 Good; > 0.85 Acceptable	0.865	0.981
IFI	> 0.9 Good; > 0.85 Acceptable	0.865	0.981
TLI	> 0.9 Good; > 0.85 Acceptable	0.843	0.973

Table 6. Fit test for structural equation modeling of multisectoral collaborative management of chronic diseases.

Path	Unstandardized path coefficient	Standardized path coefficient	*P*
collaborative processes ← Institutional design	0.770	0.739	< 0.001
collaborative processes ← Facilitative leadership	0.547	0.403	0.012
collaborative processes ← Starting conditions	0.297	0.239	0.039
Synergistic effects ← Starting conditions	0.326	0.279	0.014
Synergistic effects ← Facilitative leadership	0.620	0.485	0.003
Synergistic effects ← Institutional design	0.370	0.376	< 0.001
Synergistic effects ← Collaborative processes	0.358	0.380	< 0.001

Table 7. Chronic disease multi-sectoral collaborative management modified model path coefficients.

Elements	Synergistic effects		Total effect
	Direct effect	Indirect effect	
Starting conditions	0.279	0.091	0.370
Facilitative leadership	0.485	0.153	0.638
Institutional design	0.376	0.281	0.657
Collaborative processes	0.380	–	0.380

Table 8. Chronic disease multi-sectoral collaborative management pathway models for impact effectiveness.

present, the degree of standardization of chronic disease management in China has been greatly improved. The framework of chronic disease management with the participation of multiple departments has basically been formed, and the functions of different organizations involved in chronic disease management have been clarified in the relevant policies[22,38]. However, due to the influence of the long-standing misconception of "emphasizing treatment and neglecting prevention", as well as the misperception formed over the years that disease prevention and control are primarily the responsibility of the health sector, the participation of other relevant sectors outside the health sector in chronic disease prevention and control has been insufficiently motivated, proactive and positive, and their responsibilities have been diluted[39–43].

Drawing on the SFIC synergistic governance model, this study examines the influencing factors of multisectoral cooperation in chronic management and explores the elements that affect the participation of sectors in the prevention and control of chronic diseases. Measures are taken to address the main influencing factors, strengthen policy coordination and the linkage of multisectoral, and promote the formation of multisectoral synergistic governance for rural chronic disease prevention, control and management.

Our study identified that starting conditions, facilitative leadership, institutional design, and collaborative processes all significantly influenced synergistic effects. Specifically, institutional design exerted the most substantial impact on synergistic effects. Through relevant policies and systems, participation in chronic disease management has become mandatory across various sectors, with clarified responsibilities for each sector. For instance, in 2017, China's State Council issued the Medium- and Long-Term Plan for the Prevention and Treatment of Chronic Diseases in China (2017–2025), marking the first issuance of such a plan by the State Council specifically targeting chronic disease prevention and treatment[13]. The policy sets specific targets, making its implementation a critical focus for oversight and supervision across all levels of government. This way is designed to facilitate the realization of various planning objectives and tasks. To address health inequities in Canada, the Government has developed 33 mandate letters focused on key determinants of health. These letters clarify the responsibilities of non-health sectors and outline measures targeting the conditions in which individuals are born, live, grow, work, and age. This approach seeks to explore and utilize initiatives beyond the health sector to enhance health equity[44,45]. In response to the rise in non-communicable diseases and obesity,

Chile implemented stringent food labeling and advertising regulations in 2012 aimed at addressing the obesity epidemic[46]. Studies have demonstrated that the enforcement of these regulations has had a significant effect[46,47].

Starting conditions refer to the initiation of collaborative management of chronic diseases. There is an urgent requirement for synergistic governance in chronic disease management; however, there is currently inadequate momentum towards achieving synergy[48,49]. In chronic disease management, underlying factors such as cognitive biases, power/resource mismatches, historical collaboration, and outcome expectations between non-health and health sectors are likely to influence the effectiveness of multisectoral synergistic collaboration. Operational and technical barriers between the non-health sector and the health sector, coupled with inadequate awareness of chronic diseases in the non-health sector, hinder the establishment of clear objectives and shared values for chronic disease management[50,51]. Within the healthcare sector, there exists a certain competitive relationship among medical institutions due to disparities in resources[52,53]. The investment of resources for chronic diseases by health sectors such as the Center for Disease Prevention and Control, health insurance departments, and hospitals also impacts the effectiveness of synergistic chronic disease management[54–56].

Facilitative leadership is crucial for fostering trust, balancing relationships, and aligning interests among all stakeholders. However, differences in the strength of local government leadership and the capacity of various entities to fulfill their functions may lead to regional disparities in the effectiveness of chronic disease management. Health managers and leaders need the capability to respond to the changing landscape of chronic diseases[57]. Therefore, training is used to strengthen leaders' understanding of chronic diseases and promote the enhancement of leadership capabilities[58,59]. Furthermore, leadership style, analytical thinking, and innovative thinking are key indicators of leadership competence, which are also essential for chronic disease management[60,61].

Collaborative process is the central element of the SFIC model and is pivotal to the effectiveness of governing chronic diseases collaboratively. It includes face-to-face dialogue, trust-building, commitment to the process, consensus-building, and achieving phase outcomes. From 2000 to 2007, WHO formulated strategies, frameworks, and action plans targeting various risk factors of chronic diseases. Countries subsequently developed a series of evidence-based intervention strategies and measures addressing major risk factors, including tobacco control[62,63], physical activity interventions[64,65], diet[66,67], and alcohol restriction[68,69]. In September 2011, the United Nations General Assembly convened the High-level Meeting on the Prevention and Control of Non-communicable Diseases in New York and adopted a political declaration[70]. The 8th International Conference on Health Promotion, organized by the WHO in 2013, adopted "Health in All Policies (HiAP)" as its theme. The Declaration of Helsinki issued by the Congress formally introduced HiAP and recognized that HiAP is integral to the achievement of the United Nations Millennium Development Goals and that individual countries should focus on HiAP when drafting their post-2015 development plans. In 2015, the United Nations launched the 2030 Agenda for Sustainable Development, which introduced Sustainable Development Goals and multiple quantifiable and measurable indicators. It encourages countries to develop national strategies based around HiAP to reduce premature mortality from chronic diseases[71]. Various countries have taken measures to control the development of chronic diseases in their countries in response to these indicators and HiAP, and have achieved certain results. This exemplifies a typical collaborative process[72–74].

Policy suggestions

Based on the results and discussion, and in conjunction with the SFIC model, this study proposes a framework for the management of chronic diseases with multisectoral synergistic governance. It is shown in Fig. 4.

At the starting conditions level, establishing a robust public-interest value orientation is paramount to foster institutional trust. This requires systematic identification of comparative resource endowments and stakeholder interests across health and non-health sectors. Crucially, the complementary relationship between the professional expertise of health sectors and domain-specific resources of non-health sectors must be operationally defined. Health sectors should transition from functioning as regulatory authorities and dominant providers in chronic disease management toward becoming strategic facilitators and cross-sectoral coordinators. Concurrently, integrating key performance indicators—including disease prevalence rates and standardized management metrics—into non-health sector evaluation frameworks creates accountability mechanisms to incentivize resource commitment.

At the facilitative leadership level, establishing a Health for All Committee is essential to incorporate chronic disease management into government annual plans. This binding administrative approach exerts coordinative authority to: (ⅰ) resolve interdepartmental divergences, (ⅱ) mobilize full stakeholder participation in chronic disease management, and (ⅲ) forge synergistic collaboration. Certain departments must proactively cede authority, so as to form a synergistic governance system led by the government, with community health centers at the core and multi-sectoral participation.

At the institutional design level, establishing the comprehensive safeguard systems and regimes for chronic disease management: (ⅰ) Macro-level coordination of health and non-health sectors through governance structures featuring delineated responsibilities and seamless operational interfaces; (ⅱ) Meso-level implementation protocols defining stakeholder rights, obligations, and shared accountability mechanisms across sectors; (ⅲ) Micro-level service toolkits including evidence-based chronic disease manuals with integrated implementation/evaluation instruments for frontline providers.

At the collaborative processes level, establishing clear synergistic processes and information-sharing platforms. Strengthen horizontal and bottom-up synergies within the health system, and synergies between the health and non-health sectors. The information platform integrates information on demographics, disease composition, nutrition, environmental monitoring, sports and physical activity in the region, which facilitates the development of more scientific interventions through comprehensive information.

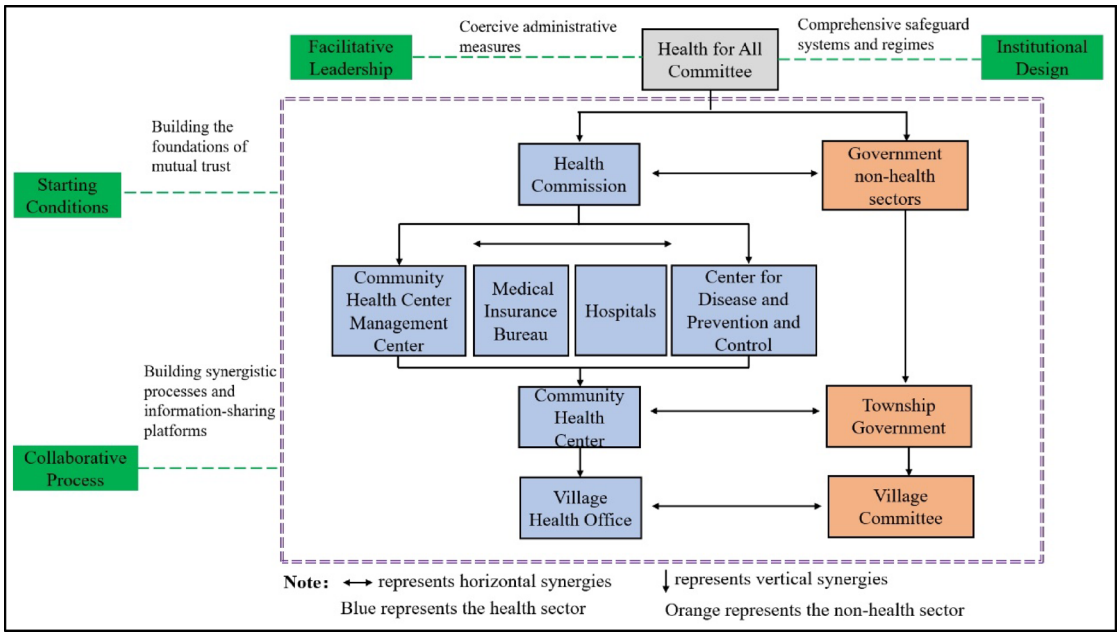

Fig. 4. A multisectoral collaborative framework for chronic disease management based on the SFIC model.

Strengths and limitations

First, this study introduces the classic synergistic governance model and applies it to the field of chronic disease management, which expands the scope of application of the SFIC model and provides a new theoretical perspective and analytical tool for multi-sectoral cooperation in chronic disease management. Second, this study enriches the research perspective of chronic disease management by focusing on both health and non-health sectors. Third, this study helps to attribute the problems of multisectoral cooperation in chronic disease management (starting conditions, facilitative leadership, institutional design, and collaborative process) and provides some reference values for strengthening intersectoral cooperation. Meanwhile, this study also has some limitations. First, this study used District H in Beijing as the study sample, which is not representative of the situation in Beijing or other areas, and the generalizability of the results needs to be further explored. Second, the selection of non-health sectors in this study was not comprehensive enough, and due to the influence of the COVID-19 pandemic, the access to data was limited, and some non-health sectors were not included in this study.

Conclusion

The utilization of the SFIC model in the multisectoral collaborative management of chronic diseases provides new research perspectives. In the multi-sectoral collaborative management of chronic diseases, starting conditions, facilitative leadership, institutional design, and collaborative processes collectively influence synergistic effects. Meanwhile, the collaborative processes itself acts as a mediator, with institutional design exerting the most significant impact on synergistic effects. Establishing and optimizing relevant systems can significantly influence the effectiveness of multisectoral collaborative management of chronic diseases. Empowering various stakeholder sectors to oversee chronic disease management processes, mobilize resource flows among sectors, and enhance awareness of chronic disease management in non-health sectors are crucial components.

Data availability

Data sets generated during the current study are available from the corresponding author on reasonable request.

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Conceptualization: JL and JY. Methodology: JL and JY. Data collection and analysis: JL, NZ and GM. Drafted manuscript: JL and JY. Supervision: JY. All the authors have read and approved the final manuscript.

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Declarations

Competing interests
The authors declare no competing interests.

Ethics approval
The studies involving human participants are reviewed and approved by the Ethics Committee of Capital Medical University (NO. Z2020SY117). The participants signed an informed consent form for their participation in this study.

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