

Policy Analysis

Cite this article: Zhou L, Zhang Q, Huang Q and Mao Q (2024). Joining Hands to Manage Transboundary Crises: A Comparative Evaluation of Policy Collaboration for Epidemic Prevention in China during SARS and COVID-19. *Disaster Medicine and Public Health Preparedness*, **18**, e298, 1–4
<https://doi.org/10.1017/dmp.2024.295>

Received: 30 April 2023

Revised: 08 July 2024

Accepted: 26 September 2024

Keywords:





transboundary crisis; collaboration network; social network analysis; SARS; COVID-19

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Joining Hands to Manage Transboundary Crises: A Comparative Evaluation of Policy Collaboration for Epidemic Prevention in China during SARS and COVID-19

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Abstract

Increasing transboundary crises necessitate the development of crisis management capabilities that transcend boundaries. In such situations, inter-governmental and cross-functional collaboration has become a common practice to address the complexities of governance challenges. This study employs Social Network Analysis to examine the structure, function, and evolution of policy collaboration networks in China in response to COVID-19 and SARS. Since the SARS outbreak, China has embraced a collaborative governance approach, considering the transboundary nature of COVID-19. This approach has led to the involvement of numerous specialized organizations engaged in economic and social development, contributing to the establishment of a larger and more loosely connected collaboration network. While the health department bears the primary responsibility for coordinating public health emergency management, diverse organizations with social governance and economic management functions have also emerged as key actors, providing crucial anti-epidemic information, knowledge, and resources to address this significant cross-border crisis.

Understanding the dynamics of policy collaboration networks is essential for effective crisis management in the face of transboundary crises. The continuous occurrence of transboundary crises such as climate change, terrorism, transnational crime, infectious diseases, and major natural disasters has touched every aspect of our communities and presented complex risks in a rapidly evolving environment.¹ These crises are typically characterized by the potential to cross geographical, policy, and functional boundaries, affecting various domains over different time scales and across different systems.² Therefore, they necessitate crisis management capabilities that bridge boundaries,^{2,3} wherein collaboration among various levels, regions, and organizations is often considered a crucial prerequisite for addressing complex governance challenges.^{4–6} A deeper understanding of how multiple organizations form networks, as well as the structure and features of these networks, is critical for enhancing the effectiveness of crisis management and network governance.^{7–9}

The policy collaboration network is an emerging concept in the field of public management that incorporates social network theory into political science and public administration. It serves as an explanatory approach and a research method to analyze the interrelationships among policy actors. This forms a network of multiple organizations, departments, or individuals as participants in the public policy process.^{10–13} In this context, policy extends beyond regulation to include broader governance processes. The collaboration network spans various stages of policy formation, implementation, and governance.¹⁰ This method is valuable for examining the roles, relationships, and contributions of network participants in coordinating disaster response actions.^{14,15}

The SARS outbreak, caused by a highly contagious coronavirus, had a profound social impact. Sixteen years later, the COVID-19 pandemic emerged as a larger-scale, wider-reaching, and longer-lasting transboundary crisis. It compelled the public sector to engage in effective cooperation and provide timely responses.¹⁶ As one of the first countries affected by SARS and COVID-19, China's fragile public health system faced significant challenges in 2003.¹⁷ However, in 2020, a collaborative network capable of accommodating actors from multiple sectors and disciplines was established to mitigate the impact of the pandemic.^{18,19} This study aims to compare changes in policy collaboration networks in response to COVID-19 and SARS. Additionally, it explores the structure, function, and evolution of these networks during 2 public health crises in China using Social Network Analysis (SNA).

Methods

Analyzing inter-agency collaboration during pandemics requires a detailed examination of policy documents. The data are sourced from policy documents for SARS in 2003 and COVID-19 in 2020, retrieved from the PKULaw Database. These policies may be issued by a single agency or jointly by multiple agencies. Each instance of co-authorship within a policy is considered a single collaboration event. We aggregated all cooperation events to form an undirected weighted network. From the 199 policies issued in 2003 and the 1055 issued in 2020, we selected 24 and 190 jointly-issued policies, respectively, as indicators of inter-agency collaboration during these 2 pandemics. The collaboration networks were analyzed using SNA, and Figure 1 presents the resulting network graphs.

Results and Findings

Forming a Way of Network Collaborative Governance

The evolution of inter-agency collaboration networks highlights significant changes over time. The comparison of networks revealed not only an increase in the number of actors and partnerships from 2003-2020 but also a significant rise in the average number of collaborations. As one of the largest countries in the world, China has implemented disaster reduction and relief efforts within a centralized government system.²⁰ In response to SARS, power was mainly centralized in the central government, with the health department leading the primary policy-making. When

accounting for differences in network size, the degree of centralization in the network was higher in 2003 (29.08%) compared to 2020 (10.9%). This suggests that the core actors dominated a more decentralized star-like or wheel-like collaboration network,²¹ as also evidenced by the betweenness centralization index (41.39% in 2003 vs. 13.41% in 2020).

However, over the past 2 decades, China has made concerted efforts to involve a broader range of stakeholders in the development of its emergency management system. In response to COVID-19, various stakeholders, including government and non-governmental organizations, as well as public and private actors, worked collaboratively to establish consensus, formulate rules, and coordinate their actions, thereby forming a network-based collaborative governance approach.^{6,22,23} Compared to the SARS epidemic, the number of policy-makers involved in addressing the COVID-19 pandemic was larger, the level of cooperation was higher, and the policy-makers encompassed a wider range of sectors.

Integrating a Loosely Coupled System

The effectiveness of loosely coupled systems in managing public health crises is a critical aspect of contemporary governance. A loosely coupled system offers advantages such as persistence, buffering, adaptability, satisfaction, and effectiveness.^{24,25} In such a complex system, the coupled elements maintain a certain level of independence and autonomy, forming a flexible whole through coupling mechanisms.^{26,27} Although collaboration and action do

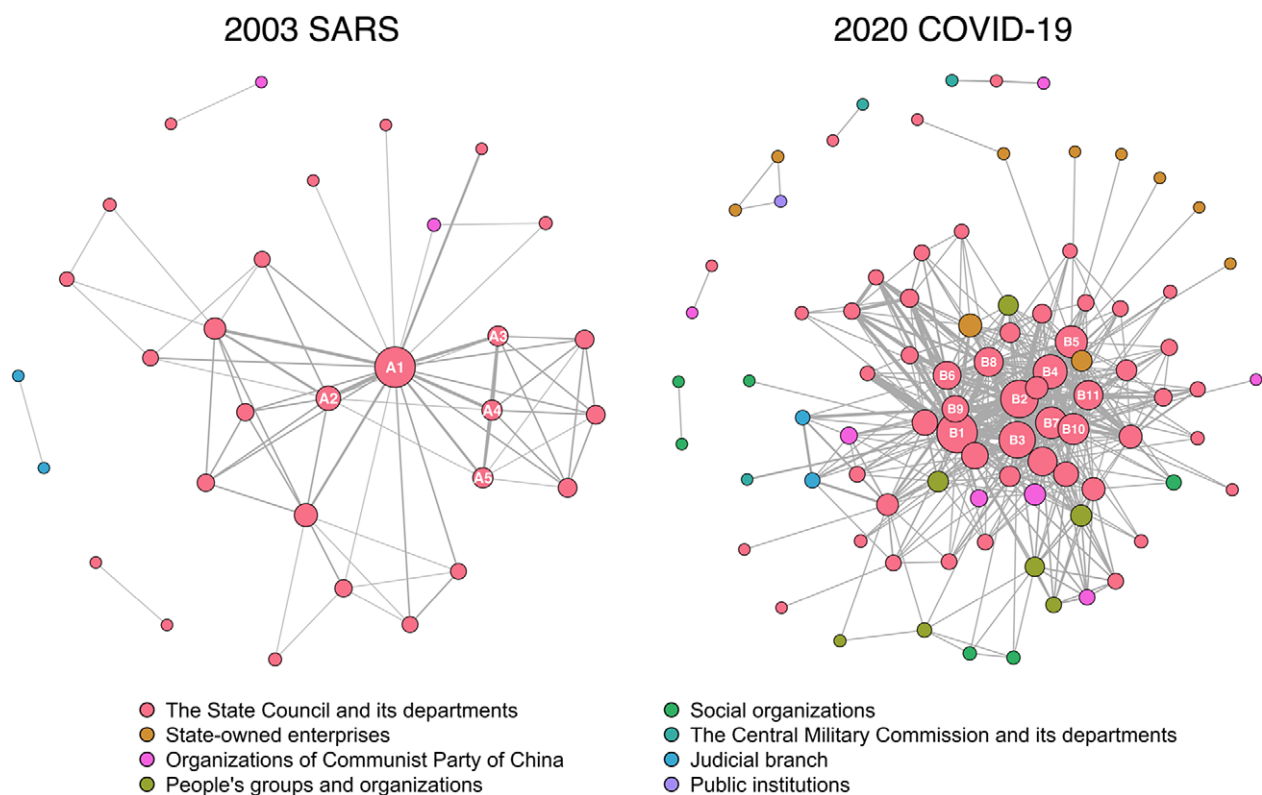


Figure 1. Collaboration network of policy-makers in 2003 and 2020.

Note: The nodes labeled in the figures represent the core actors in the 2 networks. A1: Ministry of Health, A2: Ministry of Finance, A3: Ministry of Railways, A4: General Administration of Civil Aviation of China, A5: Ministry of Communications; B1: National Health Commission, B2: Ministry of Finance, B3: Ministry of Human Resources and Social Security, B4: National Development and Reform Commission, B5: Ministry of Commerce, B6: General Administration of Customs, B7: State Administration for Market Regulation, B8: Ministry of Transport, B9: Ministry of Public Security, B10: Ministry of Industry and Information Technology, B11: People's Bank of China.

not always guarantee favorable outcomes, within a relatively loose environment, stakeholders continually adjust their relationships to achieve dynamic stability and collaborative governance.²⁸ These characteristics can be observed in the coordination among the various actors within collaboration networks.

The collaboration networks observed in 2003 and 2020 exhibited low density (0.084 in 2003 vs. 0.053 in 2020) and centralization (29.08% in 2003 vs. 10.9% in 2020), with the latter having a lower value than the former. These network indicators demonstrate that China has established a loosely coupled collaboration network to address significant public health events. Specifically, in the COVID-19 network, there was a higher number of actors, a greater variety of actors, and a larger number of core actors. The collaboration relationships were more complex compared to the SARS network. However, the density and centralization of the COVID-19 network were considerably lower than those of the SARS network. These findings suggest that, in response to COVID-19, China has fostered a more loosely coupled and extensive policy-making collaboration network, facilitating orderly cooperation and broad collaborative evolution on a large scale.

Performing Comprehensive Functions of Central and Peripheral Actors

The core-periphery structure is fundamental to understanding network dynamics in crisis management. This structure comprises 2 classes of nodes: a dense, internally cohesive core where actors are connected, and a sparsely connected periphery where actors are loosely tied to the core but not to each other.²⁹ Core actors are more productive and hold central positions in their areas of expertise. In both networks, the health department, represented by the Ministry of Health in 2003 and the National Health Commission in 2020, occupies the most central position. These departments were responsible for coordinating public health emergency management and bridging various interest groups. Additionally, in 2020, organizations involved in social governance and economic management emerged as core actors, serving as bridges and communication hubs within the network (refer to notes in Figure 1).^{30,31}

Peripheral actors play crucial roles as environmental sensors within the network. They report directly to core actors, providing valuable information and facilitating communication. This enables the network to detect small-scale developments and incorporate them into the governance process.³² The extensive participation of actors in policy-making enhances the comprehensiveness and thoughtfulness of policies by leveraging their sector or industry expertise for the benefit of core actors. Although a greater variety of actor types were involved in policy-making in 2020, primarily in peripheral roles, their significance in responding to COVID-19 was notable.

Discussion and Conclusions

Summary of Key Findings

This study systematically compared 2 policy-making collaboration networks for SARS in 2003 and COVID-19 in 2020 through SNA. We found changes in the structural and relational characteristics of policy-makers in pandemic policies over time. First, results show that China's public health emergency management has formed a way of network collaborative governance. This emphasizes the importance of diverse stakeholders in responding to complex public health crises, expanding the existing literature on collaborative

governance in emergency situations. Second, we find that a loosely coupled collaborative network promotes adaptability and resilience, allowing for dynamic stability and effective governance during a crisis. This provides practical case support for flexible coping mechanisms in public health. Finally, we identify core-periphery structures in the collaborative network. Core players such as the health departments play a key role in coordination, and peripheral players enhance the overall responsiveness of the network. This finding further deepens the understanding of the collaborative roles of players in public health governance.

Policy Implications

We recommend establishing a new type of loosely-coupled collaborative mechanism that spans organizations and borders. First, this mechanism should be a flexible and diverse network, ensuring stakeholders can swiftly coordinate during various crises. Second, it should emphasize the leading role of core actors while making full use of peripheral roles as sensors for environmental changes, which would facilitate the sharing of information and resources.

Limitations and Future Directions

This study has several points to concern. While policy documents provide a unique formal view of official collaboration, they can sometimes be "fantasy documents,"³³ reflecting more political efforts than actual implementation. Additionally, although China encouraged stakeholder participation during COVID-19, the private sector and the public cannot be reflected by this study's data because they do not issue policies. However, they may be involved in policy proposals and implementation.

Future research could combine field studies and interviews with key stakeholders to verify whether the collaborative networks described in policy documents align with actual operations. Moreover, exploring the role and influence of the private sector and the public in public health responses, and determining how they can be more effectively included in the collaboration efforts, represents a crucial direction for future research.³⁴

Competing interest. None.

Funding statement. This work was supported by the National Natural Science Foundation of China [72104226]; the National Social Science Fund of China [23CZZ038]; and the major project of National Natural Science Foundation of China [72293582].

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