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Strategy and mechanism of One Health governance: case study of China

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ABSTRACT

Background: Strategy and mechanism are crucial components of One Health governance in China, designed to address the interconnected health issues between humans, animals, and the environment. This study aims to evaluate China's current One Health governance framework, identify key strengths and gaps, and provide recommendations for establishing a more integrated and effective system.

Methods: A qualitative approach was employed, including in-depth interviews, policy analysis, and a review of existing literature, to evaluate the strengths and gaps in China's One Health framework.

Results: The analysis identified progress and challenges in six key areas: (1) political commitment: strong national support exists, but lacks a unified strategy; (2) legislation and regulation: notable legislative efforts are in place, yet they remain fragmented; (3) leadership building: effective leadership structures have been established during crises but are not institutionalized; (4) strategic planning: initial regional planning is underway, but a comprehensive national focus is needed; (5) coordination and communication: mechanisms exist but require formalized, consistent information-sharing channels; (6) stakeholder engagement: public and academic awareness is growing, yet local community involvement needs strengthening.

Conclusion: To advance its One Health governance, China must focus on creating a unified strategy, enhancing interdepartmental coordination, and deepening stakeholder engagement, ensuring its alignment with international standards and improving public health outcomes.

Abbreviations: WHO, World Health Organization; WOA, World Organisation for Animal Health; FAO, Food and Agriculture Organization of the United Nations; AMR, antimicrobial resistance; GOHI, Global One Health Index; COREQ, Consolidated Criteria for Reporting Qualitative Research; SRQR, Standards for Reporting Qualitative Research; MLG, multi-level governance; ESCPHC, Education, Science, Culture and Public Health Committee; ARAC, Agriculture and Rural Affairs Committee; ERPC, Environmental and Resources Protection Committee; MNR, Ministry of Natural Resources of the PRC; NFGA, National Forestry and Grassland Administration; MOF, Ministry of Finance of the PRC; MEE, Ministry of Ecology and Environment of the PRC; NEA, National Energy Administration; NDRC, National Development and Reform Commission; MWR, Ministry of Water Resources of the PRC; NDB, National Data Bureau; MOST, Ministry of Science and Technology of the PRC; MARA, Ministry of Agriculture and Rural Affairs of the PRC; BAHV, Bureau of Animal Husbandry and Veterinary; MOHURD, Ministry of Housing and Urban-Rural Development of the PRC; MOE, Ministry of Education of the PRC; MEM, Ministry of Emergency Management of the PRC; MIIT, Ministry of Industry and Information Technology of the PRC; China CDC, Chinese Center for Disease Control and Prevention; NHC, National Health Commission of the PRC; MOJ, Ministry of Justice of the PRC; NDCPA, National Disease Control and Prevention Administration; MOHRSS, Ministry of Human Resources and Social Security of the PRC; NAO, National Audit Office of the PRC; NATCM, National Administration of Traditional Chinese Medicine; MCA, Ministry of Civil Affairs of the PRC; NHSA, National Healthcare Security Administration; NRTA, National Radio and Television Administration; GACC, General Administration of Customs of the PRC; SAMR, State Administration for Market Regulation; NMPA, National Medical Products Administration; NBS, National Bureau of Statistics; GAS, General Administration of Sport of China; CMA, China Meteorological Administration; DRC, Development Research Center of the State Council; NPC, National People's Congress.

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1. Introduction

In public health governance, the One Health approach has emerged as a crucial framework to address the interconnected health of humans, animals, and ecosystems. Initially proposed by the World Health Organization (WHO), World Organisation for Animal Health (WOAH), and the Food and Agriculture Organization of the United Nations (FAO) following the H5N1 avian influenza outbreak in 2008, One Health aims to reduce the risks of emerging infectious diseases by fostering integrated measures across multiple sectors [1]. This approach was further refined in 2021, emphasizing the sustainable balance and optimization of the health of people, animals, and ecosystems [2].

The latest development in One Health governance increasingly highlights the importance of strategic frameworks and practical mechanisms in addressing interconnected health challenges [3]. Substantial political commitments with clarified practical pathways at national, regional, and international levels, are essential for establishing effective governance to tackle the growing threats posed by zoonotic and human pathogens [4]. Zoonotic diseases have been a primary focus of One Health governance, yet the drivers of disease emergence and transmission extend beyond zoonoses, encompassing broader risks that can lead to spillover events and subsequent outbreaks, including pandemics, across human, animal, and plant populations [5]. Cross-sectoral health issues such as antimicrobial resistance (AMR) further emphasize the need for coordinated One Health governance. AMR arises from the misuse of antimicrobials in human medicine, livestock farming, and agriculture, as well as environmental pollution, necessitating integrated efforts across sectors to mitigate its impact [6]. Moreover, global challenges such as climate change and biodiversity loss exacerbate health risks, driving disease emergence and transmission within human, animal, and ecological systems [7]. In response, an increasing number of countries are moving towards strengthening governance system to positively affect the outcomes of One Health interventions.

Recent research on One Health governance has revealed significant global and regional differences in the effectiveness of governance structures. A systematic review of One Health mechanisms emphasizes the importance of effective governance, stakeholder participation, and cross-sectoral collaboration [8]. Key challenges identified include deficient intersectoral collaboration, funding constraints, and stakeholder conflicts, all of which hinder the implementation of One Health strategies on a global scale [8]. Furthermore, discrepancies in legal frameworks, national sovereignty, and power dynamics between countries further complicate global governance, particularly when addressing emerging health threats such as zoonotic diseases and AMR [9]. China, with its rapid economic growth and historical philosophy advocating harmony between humans and nature, has made notable strides in applying One Health principles, particularly in managing zoonotic diseases and implementing regional measures like Hong Kong's avian influenza surveillance system [10,11]. Despite successes, China's adoption of a systematic One Health governance framework still faces complex challenges at ground level. The absence of consistent leadership and clear strategic direction remains a significant obstacle [12,13]. A review of China's One Health governance framework, including its legal, governmental, technical, and logistical systems, reveals key areas that require improvement [3]. For example, a qualitative study based on the Global One Health Index (GOHI) indicates that while China performs relatively well in areas such as food security and AMR control, it faces greater challenges in addressing climate change and other emerging health threats [10,14]. Despite significant efforts to strengthen the application of One Health principles in national policies, translating these policies into effective, coordinated actions across sectors remains difficult.

This warrants further investigation to shed light on the essentials of strategy and mechanisms of One Health governance in China. Through qualitative interviews to key informants, the study seeks to identify key strengths, opportunities, and gaps within the current landscape, ultimately providing recommendations for future enhancement of One

Health governance system that tailored to the present political and practical context of China.

2. Methods

2.1. Research overview

The research employs a structured, phased approach to investigate One Health governance in China, divided into three main sections. The first section, "description of current governance," focuses on mapping the existing governance structures and mechanisms related to One Health in China, providing a baseline understanding of the current landscape. The second section, "identification of key challenges," aims to identify and analyze the significant obstacles within the One Health framework through a combination of literature reviews, policy analysis, and expert consultations. The final section, "recommendation development," builds on these insights to formulate and refine strategies for enhancing One Health governance, emphasizing expert consensus to prioritize the most impactful recommendations. The study uses qualitative methods, including in-depth interviews and focus group discussions, to gather diverse perspectives. An analytical framework of strategy and mechanism related to One Health governance is applied, guided by the Consolidated Criteria for Reporting Qualitative Research (COREQ) and Standards for Reporting Qualitative Research (SRQR) to ensure the integrity and rigor of the analysis. Fig. 1 illustrates the research framework and methodology, detailing each section and the methods employed throughout the study.

2.2. Literature review

English and Chinese literatures from 2001 to 2023 were retrieved from databases including PubMed, Elsevier, ScienceDirect, Medline, Web of Science, CNKI, Wanfang, and the China Biomedical Literature Service System via the Shanghai Jiao Tong University Library. The search focused on theme words related to One Health. A secondary search was conducted within these databases using keywords relevant to zoonotic diseases to ensure a comprehensive review of the subject matter. Additionally, policy documents, including laws, regulations, and guidelines, were collected from official government websites. Grey literature and news reports were retrieved through Baidu, Google, and Bing search engines.

2.3. Participant recruitment

We conducted 41 in-depth interviews involving more than 60 experts from local-level, sub-national-level, and national-level institutions. The interviewees represented various stakeholder types, and their characteristics are detailed in [Supplementary Material 1](#). To ensure diverse perspectives, we employed snowball sampling and maximum variation sampling techniques. Given the study's focus on providing recommendations for central-level governance, we prioritized the selection of national-level experts. Additionally, since our field visits were conducted in two southern provinces of China, we included local government officials and practitioners from these regions. The selected experts represented the human, animal, and environmental health interfaces and were chosen based on their substantial professional experience, with each having at least 10 years of relevant work in their respective fields.

2.4. Data collection

Semi-structured interview guides (see [Supplementary Material 1](#)) were developed and customized. A pilot interview was conducted to refine the guides. All interviews were held in Chinese by a team of trained researchers, each lasting between 50 and 60 min. The research team had no prior contact with the interviewees before obtaining informed consent. Written informed consent was obtained from all participants before

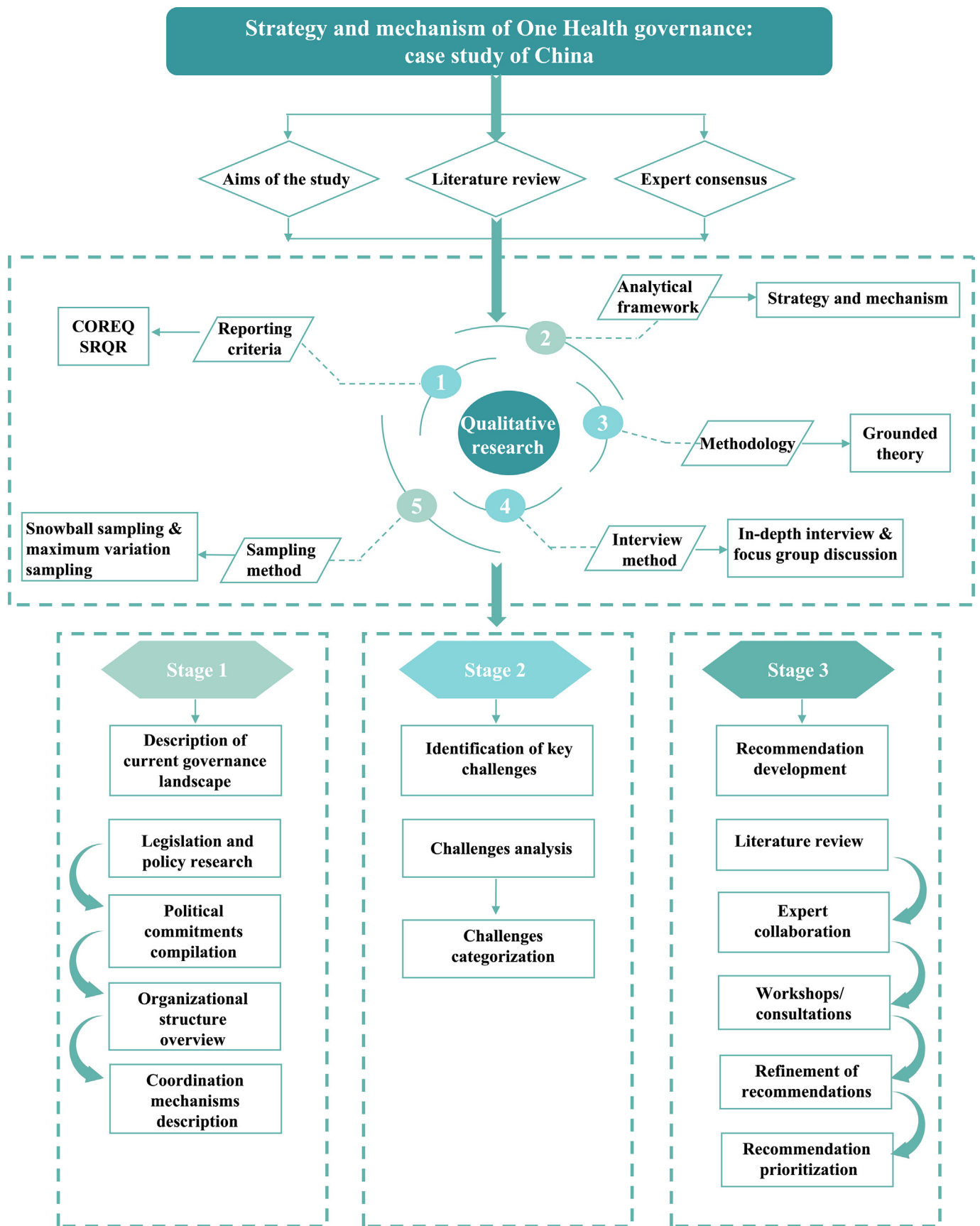


Fig. 1. Research flowchart. Abbreviations: COREQ, Consolidated Criteria for Reporting Qualitative Research; SRQR, Standards for Reporting Qualitative Research.

the interviews commenced. To establish rapport, interviewers explained the purpose of the study at the beginning of each interview. The interviews took place between January 2024 and April 2024, and were video recorded and transcribed verbatim for analysis. Each transcription was cross-checked by a second researcher to ensure accuracy. Recruitment of participants concluded once data saturation was achieved, with the research team reaching a consensus that no new information was emerging from subsequent interviews.

2.5. Data analysis

Using Grounded Theory methodology, we employed open coding, axial coding, and focused coding to allow themes and subthemes to emerge from the data. Codes were developed directly from the transcripts or based on constructs from the conceptual framework. The qualitative data analysis was conducted using NVivo 12.0 software. During the coding process, we focused on identifying barriers and enablers relevant to the project. Initially, the researchers coded the data independently, followed by discussions to reach a consensus on the finalized codebook (see [Supplementary Material 1](#)).

3. Results

3.1. Essential of the strategy and mechanism of One Health governance

This study focuses on One Health governance, emphasizing two core areas: strategy and mechanism. The One Health strategy is a fundamental element of governance that highlights the need for strong political commitment and the establishment of robust legislative and regulatory frameworks to integrate human, animal, and environmental health into a cohesive approach. Political commitment involves a nation's dedication to incorporating the One Health approach into its public health agenda, ensuring alignment with local development goals and broader international objectives. This commitment is crucial for mobilizing resources and guiding national efforts to address complex public health challenges arising at the intersection of human, animal, and environmental health. WHO has called on global leaders to reinforce their political resolve and invest in the One Health approach to collectively prevent and address shared threats to the health and well-being of humans, animals, plants, and the environment [15]. Despite growing global recognition of the One Health concept, many countries still struggle to align their national policies with its principles, often due to insufficient political will and the absence of clear legal frameworks to support multi-sectoral cooperation. Therefore, legislation and regulation are also essential components of this strategy, requiring the development of comprehensive legal frameworks and national-level strategic plans that provide clear policy guidelines and regulate the actions of all stakeholders involved in One Health initiatives.

In addition, the One Health mechanism focuses on the operational aspects of implementing this approach, encompassing leadership development, strategic planning, coordination, communication, and stakeholder engagement. Leadership building aims to empower national leadership to sustain the One Health approach as a public good, ensuring continuity and long-term investment in health governance. Strategic planning involves designing a systematic approach to address the fragmented governance of human, animal, and environmental health, emphasizing the importance of establishing a national focal point for One Health implementation. Coordination and communication are crucial to ensuring that all sectors, disciplines, and institutions work together cohesively, fostering evidence-based decision-making and consensus-building on policies and actions. Effective communication not only bridges gaps between policymakers and professionals but also aligns their goals towards a unified strategy. Clarifying shared responsibilities and overcoming vertical silos are vital for enhancing efficiency and effectiveness [16]. Stakeholder engagement seeks to involve various societal actors, from local communities to the private sector, raising awareness

and encouraging their active participation in addressing health challenges. This whole-of-society approach is essential for building strong partnerships and promoting a unified response to interconnected health issues at the human-animal-environment interface [12].

3.2. Current landscape of One Health governance structure in China

In China, the One Health governance structure follows a multi-level governance (MLG) approach, incorporating both governmental and non-governmental actors in the development and implementation of public health policies [17]. This structure facilitates the engagement of various actors across different levels of government and sectors, fostering collaboration to achieve optimal health outcomes [18]. MLG emphasizes the integration of decision-making processes among stakeholders at the national, provincial, and local levels, enhancing the coordinated efforts needed for effective One Health governance.

Central to China's One Health approach are collaborative mechanisms that promote cooperation between multiple sectors and levels of government. These mechanisms focus on aligning the efforts of health, agriculture, environmental, and other relevant sectors to address health challenges at the human-animal-environment interface. The core entities involved in China's integrated health governance system include national-level institutions responsible for human health, animal health, and environmental health, as depicted in [Fig. 2](#). Each sector's engagement ensures a multi-disciplinary approach to addressing public health issues, reinforcing China's commitment to a cohesive One Health strategy.

To illustrate the local implementation of One Health governance, [Table 1](#) provides a detailed overview of the relevant provincial-level government departments and their associated institutions, using a province in southern China as a representative example. This table highlights the specific entities that play a role in integrating health, environmental, and animal health sectors at the provincial level, showcasing how the governance structure operates within a localized context to promote cross-sectoral collaboration and comprehensive health management.

3.3. One Health strategy

3.3.1. Political commitment

For many years, China has emphasized the concept of building a "community of a shared future for mankind," which promotes collaborative efforts, mutual benefit, and sustainable development [19]. This vision aligns with the core principles of One Health by advocating for integrated approaches that consider the health of humans, animals, and the environment as interconnected elements. The emphasis on ecological civilization, green development, and the harmonious coexistence of people and nature reflects the fundamental essence of One Health, aiming to create a balanced relationship between economic growth, environmental protection, and societal well-being [20]. President Xi Jinping has consistently underscored these priorities [21,22], advocating for sustainable practices that protect ecosystems and promote the health of all living beings, thereby laying a solid political foundation for advancing One Health principles in China.

A significant milestone in China's political commitment to One Health is its inclusion in the China-WHO Country Cooperation Strategy 2022–2026 [23]. Within this strategy, One Health is explicitly mentioned in Priority Area 3.1, which emphasizes the need to "support multi-sectoral and international cooperation to establish One Health mechanisms to promote human, animal, and environmental health." This includes developing One Health programs, conducting pilot initiatives, and providing policy recommendations for managing emerging infectious diseases and AMR. The recognition of One Health as a priority area signifies a crucial step forward in China's political commitment to this approach. However, despite this strong momentum at the highest political levels, challenges remain in translating this commitment into

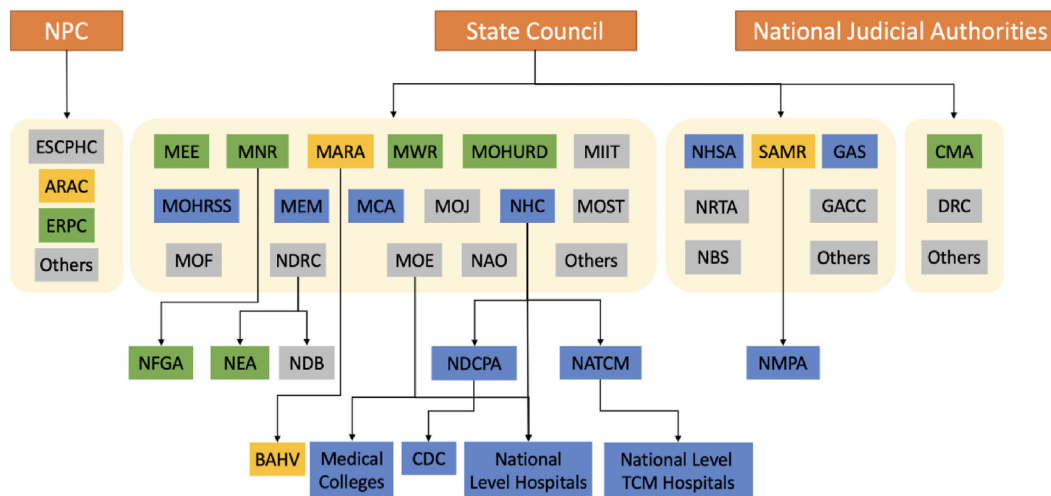


Fig. 2. Main entities involved in China's integrated health governance system. Abbreviations: ESCPHC, Education, Science, Culture and Public Health Committee; ARAC, Agriculture and Rural Affairs Committee; ERPC, Environmental and Resources Protection Committee; MNR, Ministry of Natural Resources of the PRC; NFGA, National Forestry and Grassland Administration; MOF, Ministry of Finance of the PRC; MEE, Ministry of Ecology and Environment of the PRC; NEA, National Energy Administration; NDRC, National Development and Reform Commission; MWR, Ministry of Water Resources of the PRC; NDB, National Data Bureau; MOST, Ministry of Science and Technology of the PRC; MARA, Ministry of Agriculture and Rural Affairs of the PRC; BAHV, Bureau of Animal Husbandry and Veterinary; MOHURD, Ministry of Housing and Urban-Rural Development of the PRC; MOE, Ministry of Education of the PRC; MEM, Ministry of Emergency Management of the PRC; MIIT, Ministry of Industry and Information Technology of the PRC; China CDC, Chinese Center for Disease Control and Prevention; NHC, National Health Commission of the PRC; MOJ, Ministry of Justice of the PRC; NDCPA, National Disease Control and Prevention Administration; MOHRSS, Ministry of Human Resources and Social Security of the PRC; NAO, National Audit Office of the PRC; NATCM, National Administration of Traditional Chinese Medicine; MCA, Ministry of Civil Affairs of the PRC; NHSA, National Healthcare Security Administration; NRTA, National Radio and Television Administration; GACC, General Administration of Customs of the PRC; SAMR, State Administration for Market Regulation; NMPA, National Medical Products Administration; NBS, National Bureau of Statistics; GAS, General Administration of Sport of China; CMA, China Meteorological Administration; DRC, Development Research Center of the State Council; NPC, National People's Congress.

Table 1
Provincial-level government entities and subordinate institutions for One Health.

Relevant provincial direct departments	Relevant subordinate institutions
Health commission	Center for disease control and prevention (CDC) Public health emergency command and control center
Department of agriculture and rural affairs	Animal disease prevention and control center Animal health supervision institute National animal husbandry and veterinary affairs station Fisheries surveillance corps Aquatic product quality and safety inspection center Modern agriculture inspection, detection, early warning, and prevention and control center National plant protection station (provincial pesticide inspection Institute) National agricultural ecology and resources conservation station
Forestry and grassland administration	Wildlife and plant conservation administration Forest resource monitoring center (quarantine station)
Department of ecology and environment	Ecological environment monitoring center Environmental science research institute
Administration for market regulation	Medical products administration
Haikou customs (directly under the general administration of customs of the People's Republic of China)	

cohesive, cross-sectoral actions that fully utilize the One Health framework to ensure comprehensive health security and planetary health.

3.3.2. Legislation and regulation

China currently lacks a formal national-level legal framework explicitly targeting the “One Health” approach. However, over the past two decades, the country has made significant progress by enacting and revising approximately 16 major laws and regulations related to human, animal, and environmental health. This legislative portfolio includes 12

laws and 4 regulations, as outlined in Table 2, with specific objectives and targeted areas detailed in Supplementary Material 2. These laws and regulations form the backbone of China's legal framework, addressing the complex interactions at the human-animal-environment interface and laying the foundation for a more integrated health governance system that aligns with One Health principles.

Among these legislative efforts, two recent revisions are particularly noteworthy. The first is the *Law of the People's Republic of China on Prevention and Control of Infectious Diseases*. In September 2024, a second revised draft was submitted to the Standing Committee of the National People's Congress, marking a significant step towards a comprehensive One Health framework under the State Council's guidance. This draft strengthens the infectious disease control system by enhancing monitoring, reporting, early warning, and emergency response measures. Key changes include adding unexplained infectious diseases to existing categories to boost preventive capabilities, creating a “Monitoring, Reporting, and Early Warning” chapter for streamlined responses, and clarifying quarantine procedures by requiring formal notification of patients. The draft also limits emergency measures to major outbreaks, improving flexibility in epidemic control. This amendment aligns the law more closely with other public health legislation, reinforcing the coherence of China's infectious disease control framework.

The second critical revision is the *Wildlife Protection Law of the People's Republic of China*, which plays a crucial role in mitigating zoonotic risks by prohibiting illegal wildlife trade and consumption, strengthening biodiversity conservation, and addressing the transmission of diseases from animals to humans. The revised law not only enhances wildlife protection but also reduces the risk of zoonotic disease transmission by regulating activities that threaten ecological balance. This dual focus on protecting both biodiversity and human health demonstrates China's commitment to integrating the One Health approach into its legal framework.

In addition to these legal reforms, on 23 August 2024, China's National Disease Control and Prevention Administration (NDCPA), along

Table 2
Historical evolution of laws and regulations related to One Health in China.

File name	Evolution
<i>Environmental Protection Law of the People's Republic of China</i>	The trial document was issued in 1979 Official document promulgated in 1989 Revised 2014
<i>Drug Administration Law of the People's Republic of China</i>	Promulgated in 1984 Revised 2001 Revised 2013 Revised 2015 Revised 2019
<i>Frontier Health and Quarantine Law of the People's Republic of China</i>	Promulgated in 1986 Revised 2018 Revised 2024
<i>Wildlife Protection Law of the People's Republic of China</i>	Promulgated in 1988 Revised 2004 Revised 2009 Revised 2016 Revised 2019 Revised 2022
<i>Law of the People's Republic of China on Prevention and Control of Infectious Diseases</i>	Promulgated in 1989 Revised 2004 Revised 2013
<i>Law of the People's Republic of China on Entry and Exit Animal and Plant Quarantine</i>	Promulgated in 1991 Revised 2009
<i>Animal Epidemic Prevention Law of the People's Republic of China</i>	Promulgated in 1997 Revised 2007 Revised 2013 Revised 2015 Revised 2021
<i>Law of the People's Republic of China on Quality and Safety of Agricultural Products</i>	Promulgated in 2006 Revised 2018 Revised 2022
<i>Food Safety Law of the People's Republic of China</i>	Promulgated in 2009 Revised 2015 Revised 2018 Revised 2021
<i>Vaccine Management Law of the People's Republic of China</i>	Promulgated in 2019
<i>Basic Medical Care and Health Promotion Law of the People's Republic of China</i>	Promulgated in 2019
<i>Biosecurity Law of the People's Republic of China</i>	Promulgated in 2021 Revised 2024
<i>Regulations on Emergency Response to Public Health Emergencies</i>	Promulgated in 2003 Revised 2011
<i>Regulations on Biosafety Management of Pathogenic Microbiology Laboratories</i>	Promulgated in 2004 Revised 2016 Revised 2018
<i>Veterinary Drug Administration Regulations</i>	Promulgated in 2004
<i>Emergency Regulations on Major Animal Epidemics</i>	Promulgated in 2005 Revised 2017

with eight other departments, jointly issued the *Guiding Opinions on Establishing and Improving a Smart, Multi-Trigger Infectious Disease Monitoring and Early Warning System*. This guideline outlines China's overall goals and requirements for building a comprehensive infectious disease monitoring and early warning system. The goal is to create a responsive, science-based, and efficient multi-trigger surveillance system by 2030, capable of early detection, scientific assessment, and timely alerts for newly emerging infectious diseases and unexplained group illnesses. This initiative aligns with the One Health principles by enhancing China's ability to detect and respond to health threats that span human, animal, and environmental interfaces, ultimately bringing its monitoring and response capabilities up to international standards.

Overall, the evolution of China's legislative framework over this period reflects a comprehensive shift from addressing individual domains to a more holistic approach that spans multiple species and ecosystems. These changes not only highlight a deepened focus on human, animal, and environmental health but also underscore the necessity and urgency of cross-sectoral collaboration in health governance. However,

significant challenges remain in fully implementing the One Health approach within China's broader legal and regulatory context. Current laws often operate in silos, limiting the effectiveness of a coordinated response to interconnected health challenges [24]. Continuously adapting the legal framework to emerging health threats will be crucial to building a resilient and unified health governance system that fully embraces the principles of One Health.

3.4. One Health mechanism

3.4.1. Leadership building

Currently, the government plays a central role in organizing and coordinating efforts within the One Health framework, particularly during public health emergencies. It leads cross-departmental collaboration by optimizing work systems and establishing effective mechanisms for joint action. For example, a county government in southern China has formed a schistosomiasis control task force, led by the Deputy County Mayor, which includes representatives from various sectors such as agriculture, water resources, education, and public security. This structure demonstrates a well-coordinated effort in tackling health challenges.

“Based on the national ‘Action Plan to Accelerate the Elimination of Schistosomiasis (2023–2030),’ the district government has established a local schistosomiasis control leadership team headed by the district’s main leaders. Schistosomiasis control is a regular topic in government meetings, with annual work conferences held to review progress and plan future actions.”

(Xinjian District Schistosomiasis Control Comprehensive Management Report)

The response to the COVID-19 pandemic further strengthened these collaborative mechanisms, highlighting the government's capacity for rapid mobilization during crises. The effective emergency command and joint meeting systems established during the pandemic solidified leadership structures, clarified roles, and responsibilities, and provided robust policy support. This enhanced the organizational coordination and execution efficiency of One Health initiatives.

“During COVID-19, a command center was set up, effectively coordinating departments. Even now, after the pandemic, the command center hasn’t been completely disbanded; it occasionally convenes leaders from various departments to meet and discuss.”

(Participant-6, sub-national level, administrative coordinator, human health/zoonotic disease)

Despite these efforts, there remains a lack of a unified higher-level platform or agency explicitly responsible for leading One Health initiatives in China. This absence can lead to fragmented coordination and decision-making, reducing the efficiency of emergency responses. Without a dedicated leadership structure, cross-departmental collaboration often lacks cohesion. Although China has yet to establish a systematic government framework specifically for One Health, similar concepts and ideological paradigms have begun to emerge. Expanding the pandemic command centers established during COVID-19 into broader One Health command centers could serve as a potential step forward. Furthermore, the establishment of a One Health office within the Centers for Disease Control could lay the groundwork for a comprehensive, cross-departmental One Health agency in the future.

3.4.2. Strategic planning

Strategic planning for One Health in China involves a systematic approach to resource allocation and coordination across multiple sectors, aimed at addressing the fragmented governance of human, animal, and environmental health. The government has initiated several key measures to allocate resources efficiently: firstly, by providing financial support for specific One Health projects, and secondly, by encouraging

resource allocation and sharing among various departments. These efforts have resulted in some progress, with certain units gaining access to advanced equipment, technical support, and financial assistance that have facilitated the advancement of One Health initiatives.

However, significant gaps remain in the strategic planning process, particularly at the grassroots level, where there is a pronounced shortage of human resources, especially in terms of trained public health professionals. This lack of specialized staff and the imbalance in technical resources and equipment distribution continue to hinder effective implementation.

“Staffing is one reason, and the entire city and county levels lack talent planning. There are few positions specifically for public health professionals, and other personnel occupy some of these positions. This situation is not unique to Qionghai but is common across the country.”

(Participant-12, local level, administrative coordinator, human health)

“At the city and county levels, we lack experts who are particularly knowledgeable about relevant situations. Provincial experts are more familiar with these matters, but at the city and county levels, we are relatively lacking.”

(Participant-15, local level, policy maker, human health)

To address these gaps, it is crucial to establish One Health development institutes and strengthen partnerships with universities to promote resource sharing and technical exchanges. Rational distribution of laboratories and equipment is also necessary to prevent resource wastage. Enhancing financial support, particularly for staff training and service subsidies, is also a key aspect of strategic planning that could boost the motivation and efficiency of grassroots workers. Increasing investment in human resource development will help close the knowledge and skills gap at the local level.

“Laboratories need to be reasonably distributed. Many of our labs can perform numerous tests, but this can lead to significant wastage. Some equipment might be used only two or three times over several months, leading to considerable waste.”

(Participant-12, local level, administrative coordinator, human health)

Overall, prioritizing the establishment of a national focal point to coordinate One Health activities is essential for ensuring cohesive policy integration and action. A well-structured national coordination mechanism can guide resource allocation, unify fragmented efforts, and foster sustainable implementation of One Health principles at all levels of governance. These measures will contribute to a more balanced and effective resource allocation strategy, fostering a robust One Health approach that is proactive rather than reactive to emerging public health threats.

3.4.3. Coordination and communication

Effective coordination and communication are crucial for the successful implementation of One Health initiatives. Currently, China has established cross-departmental reporting and collaboration mechanisms tailored to specific One Health actions. For example, during public health emergencies, a county government in southern China has implemented a mechanism that facilitates cooperation among various departments. Sectors such as agriculture, water resources, education, and public security work together according to predefined procedures to enhance the efficiency and speed of their response. However, this cooperation remains largely ad hoc and task-oriented rather than being based on a long-

term, stable collaboration framework. This reactive approach, driven by post-incident responses rather than proactive prevention and early detection measures, may limit the full potential of the One Health approach in preventing the emergence of novel infectious diseases.

“We only come together to respond when there’s an emergency situation.”

(Participant-9, local level, administrative coordinator, human health/zoonotic disease)

“During the pandemic, each local government had corresponding plans: we mainly collaborated with the public security and agriculture departments. The agriculture department focused on seafood, while the education department monitored schools. We needed information from the public security department for epidemiological investigations and relied on the agriculture department to monitor cold chains and agricultural products. The civil affairs department was responsible for regularly monitoring nursing homes, while the commerce department focused on markets, and the tourism department monitored places like cinemas and libraries.”

(Participant-12, local level, administrative coordinator, human health)

Although there is a growing intention among departments to strengthen collaboration and establish a multi-trigger monitoring and early warning mechanism, significant challenges remain, such as difficulties in information sharing and technical limitations. For example, agriculture, forestry, and wildlife protection departments in a county in southern China are exploring ways to enhance joint monitoring of animal epidemics. To effectively implement a multi-trigger monitoring and early warning system, further investment in technology and improvement of interdepartmental collaboration processes are needed. This includes establishing a unified information platform to ensure real-time data updates and sharing, as well as enhancing staff training. Despite the existence of mechanisms like “joint prevention and control” and the “pandemic command center,” there is often a lack of concrete action, with challenges arising from the absence of an operational platform and standardized procedures. Building on the successful experience of pandemic control, revitalizing and strengthening local coordination bodies responsible for overseeing collaboration between human and animal health sectors could help ensure that departments respond quickly and effectively during public health emergencies.

“Communication between departments still needs to be optimized. On the one hand, it’s within our own department, and on the other, it’s still separated, with people managing human health and others managing animal health, which leaves many risks unaddressed.”

(Participant-2, sub-national level, administrative coordinator, human health)

3.4.4. Stakeholder engagement

Stakeholder engagement is crucial for enhancing public awareness and promoting social mobilization in the prevention and control of infectious diseases. Currently, various departments have adopted diverse forms of publicity and education to achieve this goal. For example, customs authorities distribute brochures and place informational materials in entry and exit halls to remind travelers about personal protection, raising awareness and alerting individuals to potential risks. The Education and Sports Bureau, along with cultural and new media departments, use multimedia channels to spread knowledge and improve public awareness about disease prevention. In high-incidence areas, comprehensive health education is implemented, including setting up

schistosomiasis prevention bulletin boards and conducting health education campaigns in schools. This forms a chain of communication involving teachers, students, parents, and the broader society, enhancing public awareness of disease prevention and self-protection skills.

“The General Administration issues brochures reminding travelers to pay attention to personal protection and alerting them to potential risks.”

(Participant-2, sub-national level, administrative coordinator, human health)

“In recent years, especially after the outbreak of the COVID-19 pandemic, our focus has been on infectious disease prevention and control. Of course, we also carry out routine activities, such as campus health campaigns and the patriotic health movement.”

(Participant-24, local level, administrative coordinator, human health)

Additionally, health knowledge and infectious disease prevention are integrated into sports and health courses, cultivating students' health awareness and response capabilities, thus preparing them for future emergencies. Special health education activities are organized for specific events such as the flood season and in nature reserves. These include schistosomiasis knowledge promotion on waterways, distributing contact cards to answer visitors' questions, and events like Bird Watching Week. The Center for Disease Control and Prevention (CDC) plays a crucial role by conducting serological surveys and monitoring school absenteeism to detect potential health risks early, coordinating with publicity departments to enhance education and management for high-risk groups such as professionals and students. This social mobilization not only improves public health awareness but also strengthens overall social resilience against risks.

“We also conduct serological surveys for occupational and exposed populations in some cities and counties annually, along with educational campaigns.”

(Participant-6, sub-national level, administrative coordinator, human health/zoonotic disease)

“Comprehensive health education coverage in high-incidence areas includes: setting up 26 schistosomiasis prevention bulletin boards and 612 fixed warning signs in key endemic villages, conducting health education campaigns in primary and secondary schools in endemic townships to form a communication chain involving teachers, students, parents, and society. Additionally, we utilize face-to-face lectures and platforms like WeChat public accounts to actively promote health knowledge and policies. During the flood season, waterways become popular tourist attractions, and schistosomiasis prevention staff are scheduled daily to promote knowledge and distribute contact cards to answer visitors' questions.”

(Participant-27, local level, policy maker, human health)

Within academia, a Chinese consortium on One Health was established in 2021 [25], several symposiums on One Health were held in China, and more research centers for One Health were established in universities, research institutions, and the China CDC [26]. While widely promoted for practice and research internationally, One Health-related studies in Chinese literature have significantly increased in recent years. As of 2022, approximately 822 Chinese-language articles with “One Health” and its various Chinese expressions as key terms have been published, showing a rapid increase since 2016.

Simultaneously, public awareness and recognition of One Health are of paramount importance. A recent survey conducted in Beijing to gauge the level and distribution of “One Health” awareness among the Chinese public revealed that 40 % of respondents reported familiarity with the term, but more than double the number indicated that they recognize the core idea of interconnection between people, animals, and the environment [27]. This underscores a foundational understanding of the interdependencies within the human-animal-environment triad.

Nevertheless, there exists a significant opportunity for disseminating specific concepts and knowledge associated with “One Health” through channels such as media outreach. Numerous media outlets, including People's Daily Online and Sohu, have actively reported on and promoted the concept of One Health and related events, such as “World One Health Day”. Over a dozen WeChat public accounts, such as “One Health”, and “Consortium for One Health”, have gained increasing prominence within the public domain. This growing media engagement underscores the expanding awareness and significance of One Health principles in China, as media platforms contribute to disseminating information and fostering a broader understanding of this holistic approach to health governance.

Table 3 provides a summary of the current progress, key challenges, and policy recommendations for each component of the One Health governance framework in China.

4. Discussion

This study reveals the current landscape of One Health governance in China, highlighting both its achievements and existing gaps. China has successfully implemented various policies and regulations that address public health, animal health, and environmental protection, reflecting its commitment to a holistic approach. These efforts demonstrate a growing recognition of the interconnectedness of human, animal, and environmental health, laying a solid foundation for future development. However, despite these achievements, the current governance framework remains somewhat fragmented, with room for improvement in creating a more cohesive, centralized national strategy. Strengthening this integration will be essential as China aims to align its One Health initiatives with global standards and best practices.

In our interviews, respondents highlighted China's application of the One Health approach in managing schistosomiasis and COVID-19, reflecting significant progress in this area. Historically, China has achieved remarkable success in controlling schistosomiasis through integrated strategies that address human, animal, and environmental health factors. For instance, since 2004, the country has implemented comprehensive measures focusing on controlling infection sources, such as restricting livestock grazing in snail-infested areas and promoting mechanization to reduce the number of susceptible animals. These efforts have led to a significant decline in schistosomiasis prevalence, with 74.89 % of endemic counties achieving elimination status [28]. During the COVID-19 pandemic, China established the Central Leading Group for COVID-19 Prevention and Control to coordinate national efforts. This group facilitated cross-sectoral collaboration, integrating human health, animal health, and environmental considerations into the pandemic response. Additionally, legislative reforms, such as revisions to the *Wildlife Protection Law*, reflect the growing emphasis on preventing zoonotic diseases through enhanced governance and cross-sectoral collaboration [29]. These examples underscore China's commitment to the One Health framework, demonstrating the effectiveness of integrated strategies in managing complex health challenges.

A comprehensive national strategy is essential for integrating human, animal, and environmental health into a unified One Health approach. Firstly, it is necessary to strengthen policy provisions by developing more targeted and adaptable guidelines that bridge the gap between regulations and practice. Current frameworks like the “Action Plan to Accelerate the Elimination of Schistosomiasis (2023–2030)” have facilitated inter-departmental collaboration, but more specific policies are needed to support cohesive action across sectors. Clear guidelines will help ensure that all sectors involved in One Health initiatives are working toward common goals, thereby enhancing consistency and coordination across the board. For instance, in the Philippines, progress has been made through inter-agency task forces and emergency plans, although challenges persist in risk assessment, joint investigations, and capacity building [30]. These experiences underscore the need for comprehensive governance mechanisms and resource-sharing initiatives. Similarly, Kenya's Zoonotic Disease Unit demonstrates how a centralized

Table 3
Overview of One Health governance in China: progress, challenges, and recommendations.

One Health framework	Current progress	Key challenges	Policy suggestions
One Health strategy Political commitment	China has shown strong political support through initiatives like “healthy China 2030” and integrating One Health into the China-WHO cooperation strategy. Xi Jinping’s advocacy for ecological civilization highlights national commitment	Lack of a unified strategy for One Health across all government levels; insufficient cross-sectoral policy integration	Develop a formalized national One Health strategy that explicitly promotes cross-sectoral collaboration and integrates global best practices
Legislation and regulation	Significant progress with the amendment of laws such as the <i>Infectious Disease Prevention Law</i> and the <i>Wildlife Protection Law</i> , which emphasize zoonotic disease control	Legal frameworks are fragmented, lacking specific references to a national One Health plan; coordination among laws and policies is limited	Strengthen legislative coherence by creating comprehensive laws directly referencing one health principles, with clear guidelines for implementation
One Health mechanism Leadership building	Effective leadership structures were established during crises like the COVID-19 pandemic, with temporary command centers enhancing response coordination	Absence of a dedicated, permanent national one health leadership body to guide and coordinate efforts long-term	Institutionalize leadership frameworks by establishing a permanent One Health command center or national coordinating body to ensure consistent action
Strategic planning	Initial steps taken include regional plans like the “action plan to accelerate schistosomiasis elimination” and other localized initiatives	Fragmented approaches and resource allocation, particularly at grassroots levels; lack of a centralized focus in planning	Develop systematic and adaptable strategic plans that prioritize national-level coordination and support for regional initiatives; incorporate best practices from international examples
Coordination and communication	Existing structures like joint prevention and control mechanisms enhance departmental cooperation during crises	Communication and data-sharing between sectors are often limited and ad hoc; lacking institutionalized channels for consistent collaboration	Enhance coordination by creating standardized protocols for information-sharing and interdepartmental communication; establish a unified data-sharing platform for integrated responses
Stakeholder engagement	Active public health campaigns and academic initiatives have raised awareness of One Health principles, with increasing involvement from media and research institutions	Engagement with local communities remains limited, with insufficient public understanding of One Health’s holistic approach	Strengthen public engagement through targeted outreach and education programs; create a national One Health communication center to coordinate awareness campaigns and media outreach

Abbreviation: WHO, World Health Organization.

framework, coupled with multi-sectoral collaboration, has improved response to zoonotic disease outbreaks and highlighted the importance of integrating local traditional health systems into broader One Health governance [31]. Secondly, issuing flexible normative documents such as guidelines and action plans can ensure a more responsive approach to emerging health challenges, enabling timely adaptation of One Health initiatives while aligning with international standards. Through integrated planning and support from legal, governmental, technological, and additional support systems, as advocated by Huang et al. [3], One Health governance’s benefits can be more effectively realized, fulfilling its ultimate goals of universal health and sustainable development. Developing these flexible policies will also help accumulate experience, which is crucial for refining and improving One Health practices as new challenges emerge. Lastly, it is crucial to incorporate One Health principles into regional planning efforts. For example, certain southern provinces in China with free trade zones and regions focused on schistosomiasis control present significant opportunities for integrating One Health strategies into local development. Localized strategies can address specific regional risks and adapt to unique environmental and socio-economic conditions. Drawing on international experiences, such as Indonesia’s localized One Health strategies for rabies control [32], can provide valuable insights for overcoming resource constraints and enhancing public health outcomes in China. By learning from these examples, China can develop tailored interventions that maximize the use of local resources while ensuring alignment with broader national and global One Health objectives.

Developing a robust One Health mechanism requires a structured approach to institutionalize interdepartmental collaboration and resource-sharing practices. Firstly, it is recommended to establish a national One Health strategy and create multi-sectoral working groups to formalize cooperation across departments. A centralized One Health coordination agency could play a vital role in reducing governance fragmentation and enhancing system integrity, much like the initiatives seen in Ethiopia [33] and Indonesia [34], where national committees have been established to lead One Health efforts. These centralized bodies are crucial for steering One Health initiatives, aligning departmental goals, and reducing redundancies that often arise from sectoral silos. As Elnaiem et al. [9] discuss, global governance systems continue to struggle with sectoral silos, a challenge also evident in China. Lessons from South Asia further highlight the need for greater institutionalization of One Health practices, including multi-sectoral research and capacity-building programs, to ensure effective control of zoonotic diseases [35]. Additionally, the African Union’s establishment of a One Health Coordination Group to monitor zoonotic diseases showcases the importance of strong political commitment and the institutionalization of governance mechanisms to tackle emerging health threats on a continental scale [36]. Addressing this issue will require deliberate efforts to break down these silos and create a cohesive framework for One Health governance. Secondly, fostering partnerships with universities and international organizations by establishing a “One Health Development Institute” would facilitate resource sharing, technical exchange, and the spread of best practices. This institute could serve as a central hub to

optimize existing resources, reduce waste, and improve efficiency in the implementation of One Health projects. Lastly, creating a national One Health communication and outreach center would help to strengthen public awareness campaigns, ensure effective information dissemination, and enhance engagement across all levels of society. Effective communication strategies are vital in mobilizing community support and participation, which are key to the success of One Health initiatives. Overcoming these challenges, and drawing lessons from countries like Mexico [37], where fragmented governance limits the impact of One Health initiatives, will be key to building a resilient and unified health governance system in China.

While this study provides valuable insights into the current landscape of One Health governance in China, it is not without limitations. Firstly, the qualitative approach, including interviews with a limited number of stakeholders, may not capture the full diversity of perspectives, especially from grassroots and local-level participants. This could lead to a focus primarily on higher-level strategies, potentially overlooking the nuances of local implementation. Secondly, the study's reliance on existing literature and policy documents may introduce a bias toward well-documented initiatives, which might not reflect the most recent or innovative practices occurring in less-publicized regions. Future research should consider a longitudinal approach, incorporating a broader range of data sources and stakeholders to provide a more comprehensive view of One Health implementation at different levels of governance.

5. Conclusion

In conclusion, this study underscores China's progress in advancing One Health governance through multi-sectoral collaboration and policy development while highlighting the need for a unified national strategy. Strengthening integration, coordination, and stakeholder engagement will be crucial for aligning with global standards and enhancing China's capacity to address interconnected health challenges effectively.

CRedit authorship contribution statement

Xinchen Li: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Yanyan Zhang:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Qiyu Zhang:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation, Conceptualization. **Jingshu Liu:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Zelin Zhu:** Writing – review & editing, Investigation, Data curation. **Xinyu Feng:** Writing – review & editing, Investigation, Data curation. **Lefei Han:** Writing – review & editing, Investigation, Data curation. **Xiaoxi Zhang:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

The full study protocol and the datasets, are available, following manuscript publication, upon request from the corresponding author (Xiaoxi Zhang, zhangxiaoxi@sjtu.edu.cn).

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Declaration of competing interest

All authors disclosed no relevant relationships.

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Appendix A. Supplementary data

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References

- [1] FAO, OIE, WHO, UN System Influenza Coordination, et al., Contributing to One World, One Health: A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal-Human-Ecosystems Interface. <https://www.fao.org/3/aj137e/aj137e00.htm>, 2008 (accessed 16 October 2024).
- [2] One Health High-Level Expert Panel (OHHLEP), W.B. Adisasmito, S. Almuhairi, C.B. Behravesh, P. Bilivogui, S.A. Bukachi, et al., One Health: a new definition for a sustainable and healthy future, *PLoS Pathog.* 18 (6) (2022) e1010537, <https://doi.org/10.1371/journal.ppat.1010537>.
- [3] L. Huang, J. He, C. Zhang, J. Liu, Z. Guo, S. Lv, et al., China's One Health governance system: the framework and its application, *Sci One Health* 2 (2023) 100039, <https://doi.org/10.1016/j.soh.2023.100039>.
- [4] H. Schneider, Good governance of national veterinary services, *Rev Sci Tech* 30 (1) (2011) 325–338, <https://doi.org/10.20506/rst.30.1.2039>.
- [5] D.T.S. Hayman DTS, W.B. Adisasmito, S. Almuhairi, C.B. Behravesh, P. Bilivogui, et al., One Health High-Level Expert Panel (OHHLEP), Developing one health surveillance systems, *One Health* 17 (2023) 100617, <https://doi.org/10.1016/j.onehlt.2023.100617>.
- [6] S.A. McEwen, P.J. Collignon, Antimicrobial resistance: a one health perspective, *Microbiol. Spectr.* 6 (2) (2018), <https://doi.org/10.1128/microbiolspec.arba-0009-2017>.
- [7] S.J. Pitt, A. Gunn, The one health concept, *Br. J. Biomed. Sci.* 81 (2024) 12366, <https://doi.org/10.3389/bjbs.2024.12366>.
- [8] D.D. Faijue, A.O. Segui, K. Shringarpure, A. Razavi, N. Hasan, O. Dar, et al., Constructing a One Health governance architecture: a systematic review and analysis of governance mechanisms for One Health, *Eur. J. Publ. Health* 34 (6) (2024) 1086–1094, <https://doi.org/10.1093/eurpub/ckae124>.
- [9] A. Elnaïem, O. Mohamed-Ahmed, A. Zumla, J. Mecaskey, N. Charron, M.F. Abakar, et al., Global and regional governance of One Health and implications for global health security, *Lancet* 401 (10377) (2023) 688–704, [https://doi.org/10.1016/S0140-6736\(22\)01597-5](https://doi.org/10.1016/S0140-6736(22)01597-5).
- [10] J.S. Liu, X.C. Li, Q.Y. Zhang, L.F. Han, S. Xia, K. Kasagne, et al., China's application of the One Health approach in addressing public health threats at the human-animal-environment interface: advances and challenges, *One Health* 17 (2023) 100607, <https://doi.org/10.1016/j.onehlt.2023.100607>.
- [11] L. Sims, M. Peiris, One health: the Hong Kong experience with avian influenza, *Curr. Top. Microbiol. Immunol.* 365 (2013) 281–298, https://doi.org/10.1007/82_2012_254.
- [12] C. Stephen, B. Stemshorn, Leadership, governance and partnerships are essential One Health competencies, *One Health* 2 (2016) 161–163, <https://doi.org/10.1016/j.onehlt.2016.10.002>.
- [13] C.R. Blankart, S.M. De Gani, H. Crimlisk, M. Desmedt, B. Bauer, G. Doyle, Health literacy, governance and systems leadership contribute to the implementation of the One Health approach: a virtuous circle, *Health Pol* 143 (2024) 105042, <https://doi.org/10.1016/j.healthpol.2024.105042>.

- [14] Q. Zhang, J. Liu, L. Han, X. Li, C. Zhang, Z. Guo, et al., How far has the globe gone in achieving One Health? Current evidence and policy implications based on global One Health index, *Science in One Health* 3 (2024) 100064, <https://doi.org/10.1016/j.soh.2024.100064>.
- [15] WHO, WHO Urges Investing in “One Health” Actions for Better Health of the People and the Planet. <https://www.who.int/news/item/03-11-2023-who-urges-investing-in-one-health-actions-for-better-health-of-the-people-and-the-planet>, 2023 (accessed 3 November 2024).
- [16] I.F. Espeschit, C.M. Santana, M.A.S. Moreira, Public policies and one health in Brazil: the challenge of the disarticulation, *Front. Public Health* 9 (2021) 644748, <https://doi.org/10.3389/fpubh.2021.644748>.
- [17] E. Ongaro, T. Gong, Y. Jing, Toward Multi-Level Governance in China? Coping with complex public affairs across jurisdictions and organizations, *Publ. Pol. Adm.* 34 (2) (2019) 105–120, <https://doi.org/10.1177/0952076718799397>.
- [18] Y. Jing, D. Li, Private roles in enhancing Multi-Level Governance: China’s “Internet +” national strategy, *Publ. Pol. Adm.* 34 (2) (2019) 144–164, <https://doi.org/10.1177/0952076718764012>.
- [19] The State Council of the People’s Republic of China, Building a Community of Life for Man and Nature — Speech at the Leaders Summit on Climate. https://www.gov.cn/gongbao/content/2021/content_5605101.htm, 2021 (accessed 22 April 2024).
- [20] China Daily, Xi Leads Ecological Civilization. http://www.chinadaily.com.cn/china/2017-03/22/content_28634915.htm, 2017 (accessed 22 April 2024).
- [21] X. Tan, Y. Zhang, H. Shao, Healthy China 2030, a breakthrough for improving health, *Global Health Promotion* 26 (4) (2018) 96–99, <https://doi.org/10.1177/1757975917743533>.
- [22] Xinhuanet.com, Full text: responding to climate change: China’s policies and actions. <https://eng.yidaiyilu.gov.cn/qwyw/rdxw/194163.htm>, 2021 (accessed 22 April 2024).
- [23] WHO Regional Office for the Western Pacific, China-WHO Country Cooperation Strategy 2022–2026, WHO, 2023.
- [24] G. Fang, H. Liu, K. Wu, T. Wei, Q. Wang, et al., Changing legislative thinking in China to better protect wild animals and human health, *Conserv. Biol.* 36 (1) (2022) e13837, <https://doi.org/10.1111/cobi.13837>.
- [25] School of Global Health, SHSMU. Chinese Consortium for One Health (CCOH). https://www.shsmu.edu.cn/sghen/Consortium/Chinese_Consortium_for_One_Health_CCOH.htm, 2021 (accessed 27 April 2024).
- [26] SJTU, SJTU and the University of Edinburgh Establish One Health Center. <https://dzb.sjtu.edu.cn/En/Data/View/4520>, 2020 (Accessed 27 April 2024).
- [27] C. Wu, C.C. Astbury, K.M. Lee, Z. Gong, S. Chen, A. Li, et al., Public awareness of one health in China, *One Health* 17 (2023) 100603, <https://doi.org/10.1016/j.onehlt.2023.100603>.
- [28] Z. Hong, L. Li, L. Zhang, Q. Wang, J. Xu, S. Li, et al., Elimination of schistosomiasis japonica in China: from the one health perspective, *China CDC Wkly* 4 (7) (2022) 130–134, <https://doi.org/10.46234/ccdcw2022.024>.
- [29] G. Fang, Q. Song, Legislation advancement of one health in China in the context of the COVID-19 pandemic: from the perspective of the wild animal conservation law, *One Health* 12 (2021) 100195, <https://doi.org/10.1016/j.onehlt.2020.100195>.
- [30] L.Z.A. Dayapera, J.C.Y. Sy, S. Valenzuela, S.J.L. Eala, C.M.I.P. Del Rosario, K.N.C. Buensuceso, et al., One health in the Philippines: a review and situational analysis, *One Health* 18 (2024) 100758, <https://doi.org/10.1016/j.onehlt.2024.100758>.
- [31] P.M. Munyua, M.K. Njenga, E.M. Osoro, C.O. Onyango, A.O. Bitek, A. Mwatondo, et al., Successes and challenges of the One Health approach in Kenya over the last decade, *BMC Publ. Health* 19 465 (Suppl 3) (2019), <https://doi.org/10.1186/s12889-019-6772-7>.
- [32] C.D. Ap triana, E. Sudarnika, C. Basri, Nationally and locally-initiated one health approach in controlling rabies in west kalimantan, Indonesia, *Vet. World* 15 (12) (2022) 2953–2961, <https://doi.org/10.14202/vetworld.2022.2953-2961>.
- [33] G.A. Erkiyihun, F.R. Gari, B.M. Edao, G.M. Kassa, A review on One Health approach in Ethiopia, *One Health Outlook* 4 (1) (2022), <https://doi.org/10.1186/s42522-022-00064-z>, 8.
- [34] I.M. Adnyana, B. Utomo, D.S. Eljatin, N.L. Sudaryati, et al., One Health approach and zoonotic diseases in Indonesia: urgency of implementation and challenges, *Narrative J* 3 (3) (2023) e257, <https://doi.org/10.52225/narra.v3i3.257>.
- [35] J.S. McKenzie, R. Dahal, M. Kakkar, N. Debnath, M. Rahman, S. Dorjee, et al., One health research and training and government support for one health in South Asia, *Infect. Ecol. Epidemiol.* 6 (2016) 33842, <https://doi.org/10.3402/iee.v6.33842>.
- [36] Y. Alimi, J. Wabacha, Strengthening coordination and collaboration of one health approach for zoonotic diseases in Africa, *One Health Outlook* 5 (1) (2023) 10, <https://doi.org/10.1186/s42522-023-00082-5>.
- [37] J. Hegewisch-Taylor, A. Dreser, A.C. Aragón-Gama, M.A. Moreno-Reynosa, C. Ramos Garcia, A. Ruckert, et al., Analyzing One Health governance and implementation challenges in Mexico, *Global Publ. Health* 19 (1) (2024) 2377259, <https://doi.org/10.1080/17441692.2024.2377259>.