

Learning how to learn in the Chinese policy making process

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Declaration

This thesis is the result of the author's original research. The Introduction and concluding chapters have been composed solely by the author; papers in other chapters were composed by joint work (of which the author is the main one). Details of the authors contributions are provided in the Statement of Conjoint Work. This thesis has not been previously submitted for examination which has led to the award of a degree.

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Date: 2020-12-10

Statement of conjoint work

Chapters 2, 3, and 4 are based on conjoint work with Dr. Kun Zhao (KZ), Professor Alec Morton (AM), Professor David Bishai (DB), Professor David Peters (DP), Professor Gerry Bloom (GM), Dr. Lewis Husain (LH), Dr. Sanjeev Sridharan (SS), Yingpeng Qiu (YQ), Liwei Shi (LS), Xiaohong Cao (XC), Can Huang (CH), Xue Li (XL), Zemin Chen (ZM). I contributed 90% of the work to Chapter 2, 90% of the work to Chapter 3, 80% of the work to Chapter 4. My contributions to the conjoint work are summarised in Table 0-1. I am sole author of Chapters 1 and 5 and of the first paper in Chapter 2, meaning I had the original idea for the study, designed the study, collected and analysed the cases and drafted the Chapters. AM commented on a previous version of each of these Chapters.

Table 0-1. Contributions to conjoint work

Chapter	Papers included	The PhD author	The co-authors
2	Value-based medicine procurement reform in China	<ul style="list-style-type: none"> - Contributed to conceiving the paper - Contributed to analysis - Contributed to drafting the paper and the revision process for publication 	-
	Evaluation and learning in complex, rapidly changing health systems: China's management of health sector reform	<ul style="list-style-type: none"> - Contributed to conceiving the paper - Contributed to case studies - Contributed to drafting the paper and the revision process for publication 	- Contributed to drafting and revising the paper: LH and GB
3	Essential drugs policy in three rural counties in China: What does a complexity lens add?	<ul style="list-style-type: none"> - Contributed to conceiving the paper - Contributed to data collection and analysis - Contributed to drafting the paper and the revision process for publication 	<ul style="list-style-type: none"> - Contributed to conceiving the paper: KZ - Contributed to drafting and revising the paper: DB and DP

	Conceptual indicators framework for strengthening the Chinese health system	- Contributed to conceiving the paper - Contributed to data collection and analysis - Contributed to drafting the paper and the revision process for publication	- Contributed to conceiving the paper: KZ and SS - Contributed to drafting and revising the paper: SS and XC
	Explicit priority setting of the national package of essential public health services	- Contributed to conceiving the paper - Contributed to data collection and analysis - Contributed to drafting the paper and the revision process for submission	- Contributed to conceiving the paper: KZ - Contributed to drafting and revising the paper: AM, YQ, LS
4	Rapid HTAs in China.	- Contributed to conceiving the paper - Contributed to data collection and analysis - Contributed to drafting the paper and the revision process for submission	- Contributed to conceiving the paper: KZ - Contributed to drafting and revising the paper: AM, YQ, LS
	Maternal and child health research priority setting in Western China	- Contributed to conceiving the paper - Contributed to data collection and analysis - Contributed to drafting the paper and the revision process for submission	- Contributed to conceiving the paper: KZ - Contributed to data collection and analysis: XL - Contributed to revising and editing the paper: AM
	Cost-effectiveness analysis of high impact child survival strategy in China	- Contributed to conceiving the paper - Contributed to data collection and analysis - Contributed to drafting the paper and the revision process for submission	- Contributed to conceiving the paper: KZ - Contributed to data collection and analysis: CH - Contributed to drafting and revising the paper: AM
	Situational analysis of the Safe Newborn Project in 20 rural counties in China	- Contributed to conceiving the paper - Contributed to data collection and analysis - Contributed to drafting the paper and the revision process for submission	- Contributed to data collection and analysis: YQ, LS and ZC - Contributed to drafting and revising the paper: AM

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Abstract

While it is widely accepted that a decentralised system can enhance policy learning and the spread of best practices, an under-researched question is where that learning process takes place, and another more important and intriguing question is what supports and sustains that learning. As a highly decentralised country, China has experienced a transition from a command to a social market economy and rapid socio-economic development in the past four decades. Last year the communist country celebrated its 70th birthday. How did the communist country achieve high-speed development whilst maintaining long term stability? With recent political enthusiasm in summarizing experiences since the opening up and reform period in late 1970s, learning has become a hot word both in policy document and in research papers in China. It is seen as the main capability of both the rank-and-file communist party member and policy maker. A national strategy on improving learning capabilities has been released recently, defining learning contents, methods, and the role of the thinktank. All these raise the interest in another question concerning the policy learning: is there a high-level of learning that sustains policy learning and making in China?

Considered as a main avenue for improving the people's livelihood through government action, the health sector has undergone radical reforms and development to adapt to disease and demographic changes brought by the rapid socio-economic transitions. With its highly decentralised mode of service provision, the health system has managed to provide equal and universal access to essential medical care and public health services, in a hope of achieving Universal Health Coverage (UHC). One important strategy for achieving this has been to encourage implementation units (local governments or other organizations) to experiment and then incorporate lessons from successful interventions into national plans and policies. The

thinktank and research institutions have played an important role in supporting learning and diffusion of best practices. With latest central policy on improving the policy learning capabilities and thinktank development, China is purposefully targeting to improve governance and the learning ability of the government with assistance of thinktanks.

Using case studies in the health sector, the thesis identifies the underlying methodologies supporting learning in China and how learning capability has been enhanced in order to manage changes and seek innovations in supporting UHC. The results show that a meta learning approach has developed with the support of the national thinktank, for supporting and sustaining the distinctive policy learning process. The story of the thesis closes at the time of the COVID-19 pandemic crisis. China has impressed the world with its quick and determined actions and successful containment of an unknown disease within 3 months. This further shows the relevance of the topic to the other countries, especially low- and middle-income countries (LMICs) which need to learn and innovate local health service in the complex environment.

Key words: China; policy learning; meta-learning; thinktank; LMICs

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List of abbreviations

AEA	average expert agreement
ALOS	average length of stay
BIA	budget impact analysis
CADHT	Canadian Agency for Drug and Health Technologies

CEA	cost-effectiveness analysis
CER	cost-effectiveness ratio
CHNRI	Child Health and Nutrition Research Initiative
CHSI	Center for Health Statistics and Information
CMO	context-mechanism-outcome
CNHDR	China National Health Development Research Center
CPC	Communist Party of China
CPC	Communist Party Conference
CSS	China Child Survival Strategy
DemPro	demographic program module
DPH	Department of Primary Health
"3 E"	experiment, experience and expansion
EENC	early essential neonatal care
ENAP	Every Newborn Action Plan
EPHS	essential public health services
GAVI	Global Alliance for Vaccine and Immunization
GDP	gross domestic product
GDP	gross domestic product
GPs	general practitioners
GQCE	generic quality consistency evaluation
JPO	Joint Procurement Office
IDRC	International Development Research Centre
HBsAg+	hepatitis B surface antigen positive
HIV/AIDS	human immunodeficiency virus/Acquired Immune Deficiency Syndrome
HPV	human papilloma virus
HTA	health technology assessment
IMR	infant mortality rate
INAHTA	International Network of Agencies for Health Technology Assessment
ISPOR	International Society for Pharmacoeconomics and Outcomes Research
KTA	Knowledge to Action
LiST	lives saved tool
LMICs	low- and middle-income countries
MCDA	multiple criteria decision analysis
MCH	maternal and child health
M & E	monitoring and evaluation
MMR	maternal mortality rate
MoH	Ministry of Health
NCDs	non-communicable diseases
NCMHTA	National Center for Medicine and Health Technology Assessment
NGOs	non-governmental organisations
NHC	National Health Commission
NHFPC	National Health and Family Planning Commission
NHIB	National Health Insurance Bureau
NICE	National Institute of Health and Care Excellence

NMPA	National Medicinal Product Agency
NMR	neonatal mortality rate
NCMS	New Rural Cooperative Medical System
OOP	out-of-pocket payment
OECD	Organization for Economic Co-operation and Development
OHRI	Ottawa Hospital Research Institute
OHT	one health tool
OPS	overall priority score
RWD	real world data
MDGs	Millennium Development Goals
PBMA	program budgeting and marginal analysis
PCV	pneumococcal conjugate vaccine
PDCA	Plan Do Check Act
PDSA	Plan Do Study Act
PET/CT	positron emission tomography/computer tomography
RCT	randomised control trial
RMB	Renminbi
PRC	People's Republic of China
SARS	Severe Acute Respiratory Syndromes
SDGs	Sustainable Development Goals
SNP	Safe Newborn Project
TCM	traditional Chinese medicine
TOR	term of reference
UEBMI	Urban Employee Basic Medical Insurance
U5MR	under five mortality rate
UHC	universal health coverage
UNICEF	United Nations International Children's Emergency Fund
USD	United States dollar
UNDP	United Nations Population Fund
WHO	World Health Organisation

Chapter 1: Introduction

China is the most populous Communist country established in 1949. It has 31 provinces and municipalities, which have large disparities in terms of socio-economic development status and demographic features. In addition, it has a two-sphere society, and rural-urban divide is great in terms of access to healthcare service and welfare. There are over 2,800 counties in the country, with the largest county of 2.5 million population in Guangdong Province and the smallest one of less than 10,000 people in Tibet. There are 56 ethnic populations living in the country, and cultural, dialect, religious and custom diversities have long been documented. For better governing such a complex society, the Chinese Communist Party and government has built five tier of administrative body for governing the country, namely the central, provincial, city/prefecture, city district (urban)/county (rural), and township government. Public service provision has been gradually decentralized, and more governing rights devolved to the local governments.

Over the past four decades China has experienced a transition from a command towards a market economy, accompanied by movements of large numbers of people to the cities and population ageing (Rodrik 2013). This has been associated with big changes in the burden of disease and changes in the organisation of health services. China has also experienced major outbreaks of infectious disease. During the 1990s and early 2000s research organisations and think tanks produced reports documenting problems with access to care and impoverishment due to high medical costs, especially in rural areas. This led the government to support experiments with aspects of health system reform, including urban and rural health insurance. In the 2000s, and following the containment of SARS in the early 2000s, government

attention to health reform increased. In 2009, government introduced a major health system reform, focusing especially on financing universal health coverage (UHC), improving the quality of services and ensuring equitable access to effective primary health care. This has led to big increases in the contribution of government and social insurance schemes to total health expenditure and has stimulated an increasing concern at the highest level of government with the cost-effectiveness of health services and ensuring that funds are used to meet priority needs.

Government has become increasingly aware of the need to manage the adaptation of the health system to a context of rapid social, economic and institutional change. Its over-riding concern in health policy making is to meet rising health expectations while avoiding serious policy errors. Huge heterogeneity across the country has required tailoring of implementation to varied local conditions. One important strategy for achieving this has been to encourage local governments to experiment, and to learn from successful interventions and incorporate learning into national strategies.

The Chinese government has invested in building national capacity for health systems research and researchers have played an important role in supporting implementation and learning. This thesis focuses on the learning of how to learn by the Chinese Government, in an attempt to explaining the long-standing. From the perspective of the China National Health Development Research Center (CNHDRC), a leading national health think-tank which the author has been working for, the thesis analyses a series of studies conducted by the CNHDRC researchers, and argues that China is exploring meta learning of the policy learning (methodology of learning) with support of the think-tank. Such meta-learning *about* the learning process facilitates learning among multiple actors at multiple levels, and provides momentum for system-wide reforms.

1.1 Overview of the Chinese health system

China, as other low- and middle-income countries (LMICs), is characterised by insufficient health financing and complex systems. The country faces double disease burden of both communicable and noncommunicable diseases. The health system has undergone big transformations and reforms in recent 2 decades to gain the capacity to meet the health needs of people. Life expectancy at birth increased from 74.8 in 2010 to 77.3 in 2019, while maternal mortality rate has reduced from 31.9/100,000 in 2009 to 17.8/100,000 in 2019, and infant mortality from 13.8‰ to 5.6‰ (Ministry of Health 2009; National Health Commission 2019). Meanwhile, the total health expenditure only increased modestly — from 4.96% of GDP in 2009 to 6.58%. Although good outcomes have been achieved, issues with quality, resource allocation and utilization efficiency, as well as inequity have been documented.

However, a variety of barriers exist in terms of organisation of health systems and care, human resources, sufficient information and knowledge for decision-making, availability and affordability of essential medicines and other health technologies, policies, and reducing the financial burden of care. With increasing importance attached to health and welfare of the people, the government has launched radical reforms to address the above barriers and tailoring various health programs and projects to local complex contexts. More often, emergent behaviors of various agents and actors happen and uncertainty is high. Unexpected consequences are common with these policy and reform programs.

This section reviews the Chinese healthcare system using the World Health Organization's 6 Building Blocks for Health Systems (Murray & Frenk 2000;

WHO 2000).

(1) Service delivery

China has a complex and fragmented health service delivery system (Figure 1 - 1). It has parallel systems for medical care and public health. Corresponding to 5 tiers of government structure, public and medical service is delivered by 5 layers of providers. It is divided into rural and urban health services in the county, and primary care service is provided by the community health center (post) in the urban area, and the township health center and village clinic in the rural area.

As with other sectors in the country, the healthcare sector has also experienced decentralisation and commercialisation reforms in 1980s and 1990s. The care provision has been further devolved to local governments with recent public financing reforms in recent 2 decades. The private sector has flourished with more favorable public policies, and the private hospitals has outnumbered the public ones since 2015. However, majority of care has still been delivered by the public hospitals.

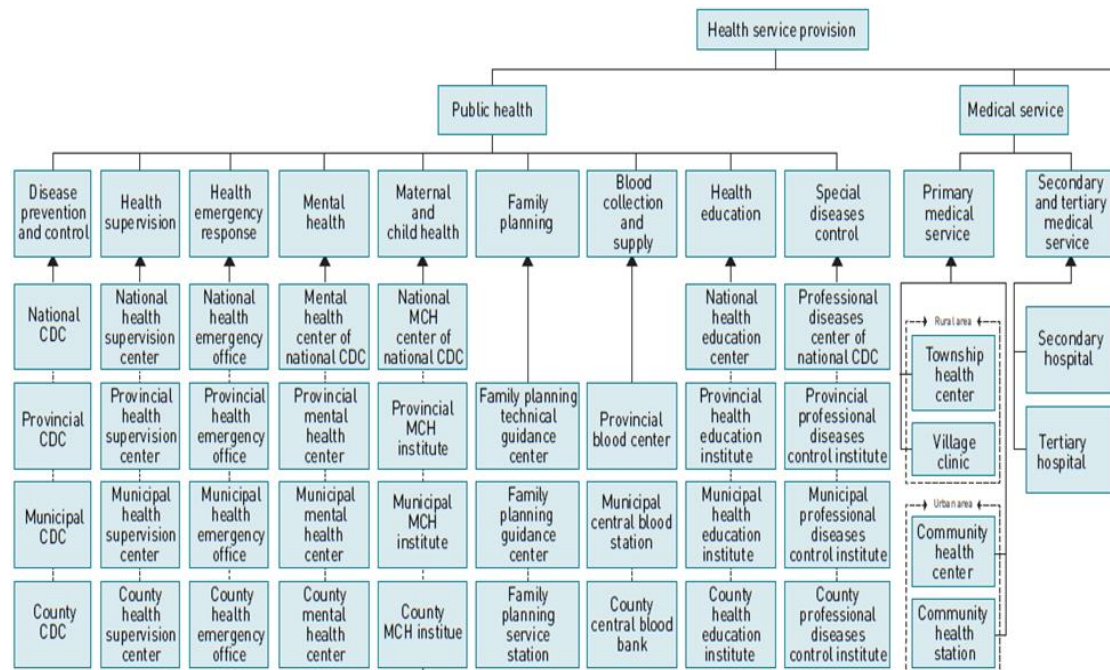


Figure 1 - 1 Health service provision in China

Recent health system reforms have addressed issues with quality, responsiveness to patients, efficiency, cost escalation, and inequity. Primary health delivery has been prioritised in the latest health system reform, to contain the cost and improve access to essential service, esp. for the rural population. The long-existing fee-for-service payment and the distorted medical fee schedule have been quoted as key issues for the service delivery strengthening (Karen et al. 2008).

(2) Healthcare workforce

China has the largest health workforce in the world—13 million in 2019 (National Health Commission 2019). There were 2.77 physicians, 3.18 nurses, 0.26 general practitioner, and 0.64 public health professional per 1,000 population in 2019. Compared to OECD average and neighboring countries like Japan and Korea, the healthcare workforce is inadequate. Without skillful primary health workers, the primary health service is underperforming, and patients usually pass by primary health facilities and go to tertiary and secondary hospitals in the city seeking care for common diseases like minor cold or blood pressure control.

Due to the socio-economic development disparities between rural and urban areas, most medical professionals concentrated in big cities in eastern region or the coastal line cities. In poor and remote rural counties in central and western region, skillful medical staff is unavailable and brain drain is a common issue for rural health facilities.

(3) Information

As the other LMICs, China had relatively weak information infrastructure. Since 2009, the national government has pumped billions of Yuan RMB into

healthcare reforms, and health infrastructure, including information infrastructure has been improved greatly. However, different hospitals have developed different information systems, and it was difficult to pool patient record and other clinical data. The decision-maker faced great challenge in making decision on the basis of poor-quality data.

(4) Medical products, vaccines and technologies

Since 2009, the Chinese government has established the essential medicine supply system (Ministry of Health and Other Eight Ministries 2009). A decade after the issuance of the essential medicine policy and the first medicine list, mechanisms concerning the production, distribution, pricing, procurement, rational use of the essential medicine have developed, and cost escalation and abnormal prescribing behavior have been controlled. However, the domestic medicine and technology market has expanded greatly, and many actors have entered the market. For instance, there are over 4,000 pharmaceutical manufacturers and 17,000 medical device manufacturers, and many more distributors are active at various local markets. Poorly-regulated health market caused issues, such as the inflated price of medical products due to long distribution channel and over- or under-use of essential medical technologies.

(5) Financing

Healthcare financing. Since late 1990s, China has gradually established healthcare insurance schemes covering its rural and urban population. The Urban Employee Basic Medical Insurance (UEBMI) was launched in 1998, the New Rural Cooperative Medical System (NCMS) in 2003, and Urban Resident Basic Medical Insurance (URBMI) in 2006. The three schemes saw disparities in financing capacity, benefit packages, copayment, and reimbursement policy. Generally, the UEBMI enrollees have been better protected than the URBMI and NCMS. With the establishment of the National Health Insurance Bureau

(NHIB) in 2018, the NCMS has merged with the URBMI, though they still have varied reimbursement ratios.

Financing of public health facilities. Most of the tertiary and secondary care is delivered by public hospitals, but due to abnormal medical fee schedule, all the public hospitals have to generate majority share of the income from delivering medical services. Medical service provision is the key income source even for public health facilities such as maternal and child health centers.

(6) Leadership and governance

In the healthcare sector, over a dozen ministries are involved in healthcare policy making process. The key ones include the regulator—National Medical Products Administration (NMPA), the health administrative body—National Health Commission (NHC), the public payer—NHIB, and the public treasury—Ministry of Finance (MoF). The cross-ministerial coordination and cooperation mechanism was often needed for planning and executing large-scale health reforms. Sometimes, it means undetermined reform plan even after tedious and lengthy consultation process and unexpected consequences caused by emergent behaviors of key policy stakeholders.

Table 1 - 1 shows the key policy actors and their roles in health policymaking process in China. These policy actors include political ones such as the State Council and the People's Congress Members at provincial, prefecture, county levels, as well as professional ones like the NHC and its local counterparts, professional associations, hospitals, and doctors. They are deeply involved in the health policy making and learning process at national and subnational level. With a more open political environment to mutual learning and stress on the participatory decision-making, even patients and their families, and civil society begin to be openly consulted for any new policy or legislation drafted.

Table 1 - 1 Key policy actors and their roles in health policymaking

Key policy actors	Roles
<i>The State Council and the People's Congress Members at all levels</i>	Legislation, deciding overall decision-making mechanisms
<i>The Ministry of Finance and its local counterparts</i>	Budget holding, expenditure decisions making
<i>The National Health Commission and its local counterparts</i>	Making decisions on health delivery, resource allocation, clinical quality control
<i>The National Health Insurance Bureau and its local counterparts</i>	Use appraisal recommendations, making pricing and payment policies
<i>The China Medical Association and its sub-branches</i>	Developing clinical guidelines, pathways, protocols
<i>Professional associations, such as the China Hospital Association and Medical Doctors' Association</i>	Changing providers' and doctors' behaviors, delivering training and other professional programs to support development of hospitals and doctors
<i>Patients and their families</i>	Understanding and apply evidence for protecting individual health rights
<i>Mainstream media and their supervisors, such as the CCTV and the National Broadcasting Bureau</i>	Disseminating knowledge and evidences, informing the patients and general public
<i>Civil society (social media)</i>	Understanding the policy-making process and impact of any decisions made

1.2 Adaptive and evolutionary policy-making in China

At the initiation of the Reform and Opening Up policy, the then president had a famous quote about the reform approach — “feeling the stones while crossing the river”, describing the reform as action of a person tentatively crossing a river, by feeling for the next foothold. Since then, such experiential and “learning by doing” approach to the reform has dominated the 20th Century Chinese reforms. It is widely accepted in China that the current reforms have entered into a “deep-water” zone (Li 2009; Li & Zhu 2013), where it is no longer easy to feel the stones as a guide to the way forward. As a result, decision-makers are facing great uncertainty and complexity (Zhou 2013). In contrast to economic reforms of previous decades, the Chinese government has to deal with large-scale reforms in economic, political, cultural, healthcare, environment and other areas all at once, calling for more coordinated and comprehensive reform plans and measures. More conflicts and contradictory interests are revealed, and increasing resistance to reforms is seen. With incomplete and opaque information and information asymmetry, it is almost impossible to assess costs and benefits of these reforms; therefore, further decision-making becomes difficult and faces great uncertainty (Li 2009; Zhou 2013). Facing such complexity and uncertainty, the Chinese health policymaker has to change their policy-making style to adapt to new situations, and find ways to drive reforms in all areas.

The Chinese government’s policy-making approach is strange to many westerners. And indeed, the approach cannot be properly understood within the western frame of reference. Explanations of China's post-Mao public policy making have focused on goals of the state and implementation at the local level. Western-originated concepts, such as rationality and power models have dominated the discussions about the Chinese policy making

process. The former focuses on problem solving, while the later on power struggles of key policy figures or interest groups. Political organisation is regarded as an essential mechanism for policy-making, so is experimenting and piloting.

Many scholars of the Chinese studies, especially the western ones, often hold misconceived views of the policy making system. They label Chinese governance as “fragmented authoritarianism”, in which authority and resources are thought to be distributed structurally across bureaucratic units (Lieberthal and Oksenberg 1988; Manion 1991). They criticise the Chinese policy-making process for lack of public participation (McComick 1987). They think most of the national think-tanks are not fully engaged in the public decision-making process. They use simple binary terms like decentralisation/centralisation and top-down/bottom-up to describe the complex central-local government interactions and policy implementation process in the country. Such over-simplifying statements are not very helpful for understanding the complex policy making system and policy changes in the country (Yan et al. 2014).

Yan and his colleagues (2014) review the 1st (1955-1958) to 11th Five Year Plan (2006-2010) for Social and Economic Development, found that the policy-making style of the Chinese government has undergone big changes (错误!未找到引用源。). With decentralisation of public service delivery responsibilities and wider participation of professionals in the public policy-making process, the agenda-setting modes have diversified and decision-making process has become open and anticipatable to the public. They argue that the Chinese decision-making approach is adaptive and continuously self-developing, embracing favorable changes with its endogenous evolution mechanism. The arguments indicate that there have been inbuilt mechanisms sustaining the evolution of the Chinese

decision-making process.

Table 1 - 2 Four decision making styles in China

<i>Decision type</i>	<i>Five-year plans</i>	<i>Decision-making bodies</i>	<i>Approach</i>	<i>Features</i>
<i>One person lays down the plan</i>	2 nd Five Year Plan (1958-1962), 3 rd Five Year Plan (1966-1970), 4 th Five Year Plan (1971-1975)	Top leaders	Random decision-making	Individual authority, bandwagon effect
<i>Internal collective decision-making</i>	1 st Five Year Plan (1955-1958), 5 th Five Year Plan (1976-1980), 6 th Five Year Plan (1981-1985)	Government	Collective decision-making, programmed decision	Democratic centralism, seek truth from facts
<i>Consultative decision-making</i>	7 th Five Year Plan (1986-1990), 8 th Five Year Plan (1991-1995), 9 th Five Year Plan (1996-2000)	Government external elite	+ Collective decision-making, programmed decision, deliberative decision-making	Democratic centralism, seek truth from facts, scientific decision making
<i>Listen to all useful opinions</i>	10 th Five Year Plan (2001-2005), 11 th Five Year Plan (2006-2010)	Government external elite public	+ Collective decision-making, programmed decision, deliberative decision-making	Democratic centralism, seek truth from facts, scientific decision making

Such an evolutionary view of the Chinese policy making process is echoed by those earlier scholars, who also saw that policy making process in China is often iterative and subject to continuous refinement with regulations, directives and instructions. Central decisions are often designed as a grand framework providing guiding principles, and may either transform into programs or “non-decisions” through a protracted process of bureaucratic negotiation (Lieberthal and Oksenberg 1988). More recent studies give particular attention to policy implementation, especially in the lens of central-local relationships, experimentation, and innovation (Saich, 2011; Heilmann 2008a; 2009). Central-local interactions and complex mutual influence between bureaucratic and non-bureaucratic units are identified (Dukkets 2003), and differential local

policy implementation documented (Chung 2000; Göbel 2011; Xiao et al 2018). It is found that local discretion, and flexible and adaptive policy implementation are actually encouraged and even designed by the national government (Zhou 2010; O'Brien 2010), though unexpected consequences are common in a rapidly changing and complex context (Xiao et al. 2013). Such an incrementalist approach to policy making offers space for learning by the government (Husain 2017; Xiao et al. 2018).

The next section will explore the policy making approach in China, and frame it from the perspective of policy learning and innovation.

1.3 Policy making and innovation in China

1.3.1 incrementalism approach to the Chinese policymaking

“Fragmented authoritarianism” has been used for discussing the Chinese approach to policy making for decades (Lieberthal and Oksenberg, 1988). It argues that policy framework developed by the central government has been adopted by various horizontal ministries and vertical agencies at different bureaucratic levels, with the actual implementation plan shaped by accommodation of interests of the implementation agencies via bureaucratic bargaining. Fragmented authoritarianism holds the view that the Chinese policy process is full of incremental changes.

Discussion of fragmented authoritarianism is beyond the scope of this thesis, but the incrementalist view expressed by this framework and vibrant vertical and horizontal exchanges do relate to the key argument of this section.

“Feeling the stones while crossing the river” is a critical concept in understanding China's reform and opening-up since the end of 1970s, and also a main methodology to guide practical socio-economic reforms in decades. It indicates that “learning by doing” approach is the dominant ideology for the Chinese policy makers, and most reforms have been explored in a step-wise and experimental manner, starting in a few jurisdictions, and expanding with extracted experience and lessons. Taking the recent centralised procurement of the generic medicine as an example, horizontally, NMPA, NHC, and NHIB have shared responsibilities, while vertically, 11 cities have been selected as the first batch of pilots, starting pilot. The pilot cities were allowed to have some flexibility in exploring slightly different models, to develop implementation details for the national reform plan.

Such a moderate and gradual approach to reforms has distinguished the China's reform from those in the other socialist countries, and contributed to the sustained economic development in decades (Liu 2018). It has the character of "Pareto improvement"—bringing benefits to some while others' interests are not hurt by adapting to non-radical changes. It tries to strike a balance between reform strengthen, development speed, and social stability in the face of great uncertainty. In the "Decision of the Central Committee of the Communist Party of China on Some Major Issues Concerning Comprehensively Deepening the Reform" issued in the third Plenary Session of the 18th CPC Central Committee in Beijing in 2013, "feeling the stones while crossing the river" is restated as the key reform approach, though recent years saw some debates over whether such an experiment- and experience-based bottom-up approach is still the right formula (Han 2014).

This incrementalist approach to reforms has also impacted the Chinese policy design in 40 years, which is characterised with vibrant interactions between government and implementation units (local government or other political or technical agencies), high adaptiveness of the political system, and existence of various vertical policy learning mechanisms, such as reforms, local piloting, and experiments (Wang, 2003, 2008, 2009; Cheng & Kang, 2015; Yang, 2015; Ling, 2016; Zheng, 2016).

1.3.2 Policy learning: unpacking the theories

The role of learning in shaping public policy has long been recognised in the public policy literature (Bennett & Howlett, 1992; Dunlop & Radaelli, 2012; Freeman, 2006). Despite scholarly interest in developing theories and frameworks of policy learning (Sabatier 1988; Haas 1992; Grief & Laitin 2004; Ostrom 2007; Berry & Berry 2007; Evans 2009), there are only a few studies

on examining the learning process and underlining mechanisms that facilitate policy learning (Gerlak & Heikkila 2011, 2013; Argote 2011). Policy learning can happen at multiple levels, such as individual, organizational or system level. There is a consensus that government needs to improve its capability to acquire information, generate knowledge and inform decisions efficiently to deliver effective service or goods in complex systems (Zollo & Winter 2002; Friedman et al. 2015). However, there are not many empirical studies on how government can improve that capability (Freeman 2006).

One particular area of concern is the role of epistemic actors (the expert and researcher) in the learning (Haas 1992; Lindquist 1992). In the epistemic communities model, the expert is teacher and knows clearly what is policy-relevant knowledge (Haas 1992). With increasing understanding of the complexity in policy making, later scholars recognise high uncertainty of defining the knowledge need, and draw on the expert to help define the goal and need for knowledge. Then with the accumulated studies on the role of thinktank, some researchers take the view that the expert is no longer considered as teacher, but forms a principal-agent relationship with policymakers (Rowe and Shepherd 2002). Another totally different strand of research looks beyond the traditional teacher (expert) and learner (policymaker) divide, and draws the attention to collective learning of policy actors (expert, policymaker, civil society organization, etc) (Freeman 2006).

Some researchers study the experimental and reflexive dimension of learning, and define policy learning as experimental processes of trial-and-error with different types of knowledge and tools (Moynihan 2005; Lenoble and De Shutter 2010; Sabel and Zeitlin 2008; Sanderson 2002, 2009; Fischer 2003; Schmidt 2002). The studies label such experiential policy learning as a specific type of governance — experimental governance. This approach regards learning as a highly interactive process and holds an evolutionary

view of learning. As claimed by the main authors, such reflexive leaning occurs when uncertainty is high. There is no longer a clear distinction between learner and teacher. However, how such experimental and reflexive learning leads to change of public policy is less discussed, and more remains to be done to study how the evolutionary learning mechanism can be built and works empirically (Dunlop & Radaelli 2013, 2016; Zito & Schout 2009).

1.3.3 Policy learning and innovation in China

While China's policy implementation has been studied for decades, the study of policy learning and innovation has recently gained increasing attention as a possible explanation of the government's capabilities to manage rapid changes in complexity and improve public service, such as health and welfare (Petrick 1981; Gu 2013; Teet 2014; Husain 2016; Xiao et al. 2017). The latest scholars attribute learning as the driving force for successful socio-economic reforms since 1970s onward (Zheng et al. 2018). It allows and encourages flexible implementation of policies and tailoring of reforms to the local context. It also helps reduce the risk of big policy failures, and learn and scale up the best practices. Since the Reform and Opening Up in the late 1970s, the Chinese government has managed large-scale reforms across many policy areas. There is increasing understanding of the importance of policy learning in many of China's reforms.

In fact, the Chinese society has a long-holding respect for learning, ever since the launching of the imperial examination system. In the 70 years' history of the P. R. China, there have been several milestones of government learning. Mao Zedong recommended to localise and contextualise Marxism in his report *Reforming Our Learning Style* on the high-level leaders' meeting in May 1951. In the 11th Communist Party Conference (CPC) in 1978, Deng Xiaoping recommended to "feeling the stones while crossing the river", indicating an

approach of “learning by doing” or experiential learning adopted during the opening reform period.

Through reviewing the learning strategies adopted by the CPC at different stages in the past century, Xi Jinping (the current Chinese president) declared that learning is key for sustaining civilisation, leading a meaningful life, consolidating the governance, and pursuing national prosperity (Xi 2007). The 4th Plenary Session of the 17th Communist Party Conference in 2010 was regarded as a milestone for the Chinese governance and national policy, for it reiterated the importance of the Opening up and Reform. Learning explains why the Chinese Communist Party is capable of managing the country (Xi 2007). China used learning organisation theories to develop the concept of the learning Party organisation, and issued the Guidance on Promoting Development of the Learning Party Organisation in 2010, which regards learning capacity as a key characteristic of the Chinese Communist Party, and requires to institutionalise learning and build learning mechanisms. Later, Xi and the Chinese Communist Party propose to build a learning society, and make further requirement on society-wide learning.

In 2013, the Chinese government issued "Decision of the Central Committee of the Communist Party of China on Some Major Issues Concerning Comprehensively Deepening the Reform", and urged to “build and develop a new-type of think-tank, and establish a policy consultation mechanism”. Then in 2015, the Opinion on Building New-type of Thinktank with the Chinese Characteristics was released by the government, defining the key role of thinktank in policy making and governance, and instructing on how to strengthen the role and build relevant mechanisms to support that role. It shows the commitment of the government to formally institutionalising the thinktank’s role in policy making.

With rising interest in state capacity (Fukuyama 2004), some scholars begin to study Institutional innovation and learning in explaining the Chinese government's capacity for managing socio-economic reforms (Foster 2005; Fewsmith 2006; Husain 2015). Innovation is defined as a process of generation, using and spreading of new ideas that work (Mulgan and Albury 2003), and putting ideas to work to cope with a changing world (Husain 2015). The idea of government innovation links public policy making with its implementation (Hill & Hupe 2009). In the Chinese context, government innovation studies focus on the particular mechanism that facilitates learning, not only between national and sub-national government (Husain 2013a; 2013b; 2015), but between multiple policy stakeholders (Xiao et al. 2018). Innovation is part of China's strategy of managing change and adaptation during rapid and complex reform processes (Husain 2013 2015).

1.3.4 China's healthcare reforms and learning process

As with other sectors in the country, the healthcare sector has also experienced decentralisation and commercialisation reforms in 1980s and 1990s. In 1996, the Chinese central government started the first round of health system reform, which was judged by the National Development Research Center of the State Council as a complete failure. This was the prelude of the intensive rounds of healthcare reforms since early 2000s (Meng et al. 2019).

Healthcare systems are increasingly considered as complex adaptive systems, in which a range of non-linear and emergent behaviours occur (Paina & Peters 2011; Xiao et al 2012). The hugeness of China, and the varied conditions in different areas pose substantial challenges to reformers, and militate against adopting one-size-fits-all policy solutions. As with reforms in

other policy areas in China, reform of the health system has been through a process of trial and error. As a consequence, approaches to change management in China have frequently emphasised the importance of sub-national experimentation, innovation, and learning (Xiao et al. 2017).

Most health reforms in China have been implemented incrementally (Liu & Bloom 2010). The Chinese policy makers seem to anticipate a long and complex process requiring an incremental approach to try out new ideas and methods. Making positive changes and adapting to favorable changes occur together in this reform approach (Luo 2011). This enables the government to reduce the risk of making big mistakes, and gives various stakeholders time to adapt to changes brought about by the reform (Liu & Bloom 2010). Given China's large size and big disparities between different localities, it is almost impossible for the central government to require all provinces, cities and counties to implement a health policy in a uniform way. After the decentralisation reforms of the 1990s, local authorities acquired more power over economic and social development decisions, which increased diversity across various localities. A general pattern of health policy implementation has appeared in pilot studies, namely the "experiment, experience and expansion" (3 E) approach (Liu & Bloom 2010). Following broad policy statement and reform strategies, local provinces are supposed to develop their own implementation plans and experiment on respective models within their local context. As documented by Bloom and his colleagues (2010), policy implementation in China is viewed as "an iterative process in which local experiences are rapidly fed back to policy-makers to revise designs continuously". Experiences and lessons are collected from time to time to enable rapid learning of key stakeholders and fed back to decision-making process. Finally, good models are identified for promotion and scaling up.

This 3E approach to health policy reflects the Chinese decision-makers'

anticipation of great complexity in policy development and implementation. Different from traditional top-down and bottom-up splits of implementation literatures, the Chinese approach to health policy implementation tries to reconcile top-down and bottom-up perspectives in embracing to realities down on the ground. Matland (1995) proposes the Ambiguity-Conflict Model of policy implementation, identifying 4 paradigms (Figure 1 - 2) namely, low conflict-low ambiguity (administrative implementation), high conflict-low ambiguity (political implementation), high conflict-high ambiguity (symbolic implementation), and low conflict-high ambiguity (experimental implementation).

		CONFLICT	
		Low	High
AMBIGUITY	Low	<p><i>Administrative Implementation</i></p> <p>Resources</p> <p>Example: Smallpox <u>eradication</u></p>	<p><i>Political Implementation</i></p> <p>Power</p> <p>Example: Busing</p>
	High	<p><i>Experimental Implementation</i></p> <p>Contextual Conditions</p> <p>Example: <u>Headstart</u></p>	<p><i>Symbolic Implementation</i></p> <p>Coalition Strength</p> <p>Example: Community action agencies</p>

Figure 1 - 2 Ambiguity-conflict matrix: policy implementation processes

With the health system reform entering the “deep-water zone”, most recent health reforms in China fall into the category of experimental implementation, whose outcomes highly depend on actors’ engagement, resource availability and other external conditions. With policy ambiguity, implementation may vary from site to site. A large group of actors may be active in molding policy implementation for their individual interests. According to Matland, this type of implementation is readily influenced by contextual factors, therefore, natural mutation of implementation may happen easily. This view of policy

implementation is helpful in facilitating learning of new means and ends of iterative policy implementation process. Since “evaluation and feedbacks are vital components of effective learning” (Matland 1995: 167), the Chinese health reforms tend to have a natural call for evaluation and evaluative thinking. Such evaluation should be formative in nature, with innate focus on process.

China’s encouragement of experimentation in areas such as healthcare reform poses theoretical and practical challenges for researchers, evaluators and policy makers faced with the challenge of ‘managing for emergence’ – how to learn from decentralised, and often uncoordinated, experimentation in order to inform change at scale? Some Chinese research institutes and universities are responding to policy makers’ evolving demands for learning reforms by experimenting with new methods and approaches to evaluation of reforms, including developmental and realist approaches, and these are becoming parts of the Chinese evaluation repertoire, used to screen emerging policy innovations, systematise learning from pilot reforms, and promote systemic learning. The approaches visible in China are a work in progress, and are evolving rapidly (Xiao et al. 2012; Xiao et al. 2018).

Despite the ubiquity of use of experimentation and innovation in China’s reforms, there has been little attention to assessment or evaluation practices employed in screening for, and promoting, practices of systemic usefulness (Ravallion 2009). The great variation in policy practices that arises in different localities from flexible implementation and dispersed innovation, as well as the speed of change, create challenges for evaluators trying to summarise and evaluate models, policies and practices developed by local governments. In many cases, and in common with many developing country contexts, these challenges are compounded by limited availability (or poor quality) of data needed for understanding local reforms – especially at the beginning of any

given reform process – and relatively limited transparency and accountability.

Increasingly, evaluation is used to hold various actors accountable, and to promote rapid learning and support change management in dynamic and complex systems. As China's reforms progress, and as government demands for support increase and become more sophisticated, government and research institutes are increasingly looking beyond evaluation/assessment repertoires they have traditionally made use of, such as cost-effectiveness and impact analyses, and are experimenting with methodologies and approaches more able to assess emergent behaviours and innovations, understand the systemic genesis of such practices and thereby contribute to policy-making or refinement. Research institutes such as the CNHDRC are experimenting with new approaches and methodologies, such as developmental and realist evaluation, with using elements of complexity theory and systems thinking to capture emergent behaviors, and with using program theory to make sense of multiple layers of complexity (Pawson and Tilley 1997; Patton 2008, 2011; Paine & Peters 2011; Xiao et al. 2012; Marchal et al. 2014; Bamberger et al. 2015).

Such evolving trend of methodologic development reveals the interest in theory-driven evaluation (Coryn et al. 2011) on the part of the Chinese evaluators. This new strand of work stresses on explaining how programs worked, not just judging whether they worked. It holds that reality is socially constructed and depends on human interpretation (Bhaskar 1978; Archer 1995). Influenced by such an approach, evaluators are no longer emotionless third-party observer, but actively engaging in the process of learning and knowledge sharing with all the other key actors (Pawson & Tilley 1997).

1.4 Framings of learning in policy process

1.4.1 Policy learning as key mechanism for gaining policy capacity

Public policy aims to solve societal problems (Peters et al. 2018). In order to meet the goal, government needs to develop its capacity of making and implementing policies in a complex world. Recent policy studies define *policy capacity* as the combination of analytical, operational, and political capacities at the individual, organization, and system level (Mukherjee & Bali; Wu et al. 2017). While most attention focuses on exploring defining capabilities for designing and implementing policies, how can government map, use and manage policy-related knowledge raises interests among scholars (Parsons 2004).

Attaining responsive policies requires accurately assessing situations and designing appropriate tools to address them (Howlett, Mukherjee and Woo 2015; Bali, Capano and Ramesh 2019). Policy makers need to collect data to conduct relevant analyses, and attend to future known and “unknown unknowns” (Nair and Howlett 2017). In dealing with a world with great uncertainty, policymakers have to design a policy structure and adjust it in response to changing conditions continuously (Bason 2014; Howlett and Mukherjee 2014; Mulgan 2008). Such a view could perfectly explain the evolutionary policy process and incrementalism reform approach taken by the Chinese government. However, it holds the assumption that government anticipates the complexity and unknowns, and have a clear strategy of designing and using tools for the gaining capabilities.

Heilmann studies policy experimentation and innovation in China since 1979 and claims that China is a “learning authoritarian state” (Heilmann 2008b: 2). Experimentation, as the most important mode of policy development, has served as a crucial means for avoiding policy deadlock and reducing risks stimulating policy entrepreneurship, and contributed to a continuous refinement of policy content and implementation.

Building a learning and innovative Marxist Party has been stressed in the policy document of the 18th People’s Committee Meeting (People.cn 2013). Learning has been valued all the time, but never in such an explicit way in the key policy document that set tone for the mid-term reform and development in the country. Xi Jinping, the Chinese President mentioned “capability panic” of the Party, and repeatedly reiterated learning as the means to ease the panic (Zhuang 2019). Besides learning of the epistemology and ontology of Marxism, the Chinese Communist Party points out the need of improving methodology of learning—research and investigation (Xi 2011). Learning is framed as the key mechanism for improving policy and governance capacity, and reducing political and managerial risks. Main modes of learning include theory- and practice-based learning, learning from experts and scholars, as well as learning of international experiences. Reflexivity is emphasised as key to the effective learning, and a spiral and continuous “learning by doing” approach is expected (Dangjian 2016).

1.4.2 Policy learning as key mechanism for managing changes

Change management is discussed most widely in the management world. Organisational learning literatures define learning as “the development of insights, knowledge and associations between past actions, the effectiveness of these actions and future actions” (Fiol and Lyles 1985). And learning happens “whenever errors are detected and corrected, or when a match

between intentions and consequences is produced for the first time” (Argyris 1995: 20). Most of the literature on learning in government organisations draws upon management theory. Plan Do Check Act (PDCA) cycle is well-known 4 step cycle in the management field, widely used for learning and performance improvement. In late 1950s, Deming adapted the cycle to Plan Do Study Act (PDSA - the so-called Deming cycle) (Deming 1950), to emphasise on continual improvement and iterative learning in complex contexts. The Study stage implies a much deeper analysis of errors than mere checking, and indicates the possibility of reflections and learning from problems.

The Deming cycle is meant to implement changes. At the Plan stage, the objective is defined and action plan formed. At the Do stage, the proposed change is implemented, and data collected. At the Study stage, outcomes are assessed to test the validity of the plan, and bottlenecks will be identified and removed. At the Act stage, learning will be realised through knowledge translation and theory forming (Deming 1990). PDSA is helpful for building a problem-solving process in complexity, for it can facilitate learning and identify innovations. The profound knowledge has 4 parts, namely, the knowledge of a system, knowledge of variation, theory of knowledge, and knowledge of psychology. The theory has a strong appreciation for a system which is composed of interdependent parts or agents.

Deming’s explanation of the system of profound knowledge for transforming management is helpful for understanding policy changes in China. It can serve as an initial framework for framing the learning approach in the Chinese policy process. The policy framework developed at the national level serves as an initial plan, which is followed by actions at subnational level in the form of piloting or experimentation. The 3 stages in the “3E” model in health policy making are corresponding to the Do, Study and Act stages of Deming cycle.

Deming cycle captures another important aspect of the Chinese policy process, that is the iterative and continuous refining through practices and experiments. However, how the policy- or decision-maker learns and identifies innovation is not clearly presented in the PDSA model.

Argyris reviewed the political science literatures and claimed that potential role of learning and feedback in the decision-making process is largely ignored (Argyris 1976). Argyris and Schön describe two different levels of learning (Argyris & Schön 1974) (Figure 1 - 3). The basic level is the identification and correction of error—so-called “single-loop learning”, which cannot change organisational objectives and processes—action strategies. The second level of learning termed “double-loop learning, is more radical and active, which is about redefining of the organisation’s such as goals, policies, design of programmes, etc.— governing variables of action strategies. Different from traditional single loop learning which focuses on cognition, double loop learning stresses on reflexivity, and requires for modification of an organization’s underlying norms and values. In this type of generative learning, problems or errors become opportunities for reflection on and sustaining innovations. Argyris and Schön considered double-loop model as more effective learning for decision-making. Valid information, free and informed choices, and internal commitment are key governing values of double-loop learning (Argyris & Schön 1978;1996).

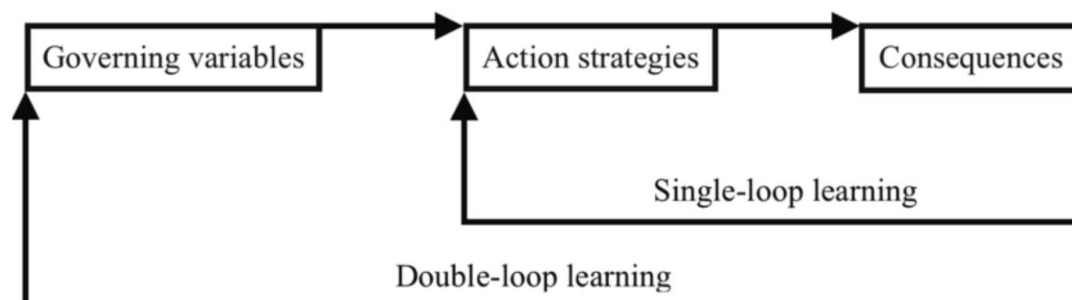


Figure 1 - 3 Single-loop and double-loop learning (Argyris and Schön, 1974)

Single-loop learning is aimed at achieving a set outcome by adjusting practice and behavior; double-loop learning includes the possibility of changing the underlying programme and set outcome. Double-loop learning requires reflection on and inquiry into the governing variables, values and norms underlying organisational action. Reviewing the policy process in China, the open or semi-open sub-national piloting and experiments (Husain 2017) can be seen as double-loop learning mechanism in the Chinese policy making process, examining the theory of reform program and giving opportunity for refining and changing the policy framework designed at the central level. However, to gain learning capabilities has been identified as the key strategy for the Chinese reform, and it even prescribes plan for strengthening the learning capability of the policy-making system as a whole. The key question related to the thesis is how policy learning capacity can be enhanced through purposeful actions.

In their further work, Argyris and Schön (1978; 1996) introduced “deutero-learning” a term originally formulated by the British anthropologist Gregory Bateson (1972), which is defined as a ‘critically important kind of organisational learning.’. As a more proactive “second-order” learning, deutero-learning is meta-form of single- or double-loop learning, which can support organisations in gaining the capacity to learn by developing and testing new tools and strategies of single- or double-loop learning. This is often defined as “learning about learning” or meta-learning, which concerns learning of the process of learning itself (Argyris 2003). It implies that individuals or organisations reflect on and inquire into the process in which single- and double-loop learning take place. Reflecting on the single-loop learning process requires for thinking how to improve error detection and correction for improving effectiveness of action strategies, while reflecting on the process of double-loop learning requires for thinking how to improve

discussion about norms and values underlying action strategies (Argyris, 2003; Schön, 1983, 1987; Visser 2007).

Definition of deuterio-learning

Deutero-learning: the word “deutero” is from the Greek word deuterios, meaning second or farther from. The term deutero-learning was invented in 1942 by Gregory Bateson, to describe the context in which a higher-level learning process happens. It refers to human behavioral adaptation to patterns of conditioning in relationships in contexts. For instance, when people learn about riding a bike or acquiring a language, they can also learn something about the governing rule of how such things occur and develop habits of learning. It was introduced in studies of organisation learning by Argyris and Schön (1978), to refer to the further learning of single- and double-loop learning. It is defined as cognitive rethinking, critical reflection, and inquiry into learning process itself—meta-learning (Argyris and Schön 1978; Argyris 2003; Schön 1983, 1987). Compared to the original concept of Bateson, Argyris and Schön stress on the role of reflexivity or reflective practice of the learner, and use deutero-learning to describe a purposeful and active learning process that aims to go meta about different levels of learning.

Deutero-learning improves the framing of the learning as a critical means of managing changes in the Chinese policy-making process. In addition to an evolutionary and continuously refining policy process based on practice and experiment, as conceptualised in the Plan Do Study Act model, there is an innate call for learning of learning itself in the Chinese decision-making style. Xi Jinping has pointed out the need to build up the learning capabilities of the Party and the government. Such a call is more concerned with the methodology of different levels of learning, and aiming to solve the issue of how to improve learning effectiveness and overcome policy capability panic.

However, terminology ambiguity of deutero-learning has been noted (Visser 2007). Deutero-learning at the organisational level sometimes is defined as a process of collaborative inquiry and reflection (Argyris & Schön 1978), and

sometimes to the structures, policies, and techniques facilitating that process (Argyris & Schön 1996; Schön 1975). What's more, the mainstream theory studies on deuterio-learning (Argyris and Schön 1978, 1996; Argyris 2003; Schön 1983, 1987) may neglect the aspects of adaptive behavior, context, and relationship that were central to Bateson's original concept.

Here raises the question relevant to the rationale of examining the Chinese case studies in the thesis: can the Chinese cases contribute to the study of deuterio-learning theory itself? The next section will examine the main research questions concerning learning in the Chinese context, and try to answer the question above.

1.5 Main research questions of learning in China

1.5.1 What is the main mode of the policy meta-learning?

China is trying to build a learning state and improve the Party and government's learning capabilities. Based on Plan Do Study Act model and deuterio-learning theory, it would be interesting to study and identify the main mode of learning of the policy learning process in China. The health sector has seen large-scale radical reforms implemented in stages in recent decade, and many think-tanks and research institutions have mushroomed and actively participated in the reform process. Against the background of global trend of achieving UHC, it would be interesting to examine how it has approached meta-learning and developed methodology of single- and double-loop learning in implementing these continuous health reforms.

This thesis will attempt to answer three key questions in studying the learning mode in health reforms, namely: 1) what is the nature of the learning process in China? (single-loop learning and double-loop learning); 2) What are the key mechanisms of methodological learning (how does learning take place)? 3) What common outcomes of learning are expected and achieved? A tabulated analytical framework based on the key questions can be found in Table 1 - 3.

Table 1 - 3 Key questions to address in studying the mode of meta learning

1) What is the nature of the learning process?	What is the level of learning? (single-loop or double-loop learning; individual, organizational, or system level)
	Who learns and who teaches?
	How does environmental factors condition learning?
	What is the context in which learning takes place?
2) How does the meta-learning take place?	What are the learning mechanisms?
	What is learnt?

3) What learning outcome is achieved?

To what extent the learning has supported: 1) single-loop learning, such as improving effectiveness and reducing error; 2) double-loop learning, such as adapting or innovating action strategies to manage changes better.

1.5.2 What are the main tools for the meta-learning?

To support the learning of learning process itself, there is a need for developing the suitable tools for gaining learning capabilities. What is the main methodological approach to policy learning? We can find a full account of it in Xi Jinping's explanation of learning. He mentions research and investigation of the key issues in reality as the key methodology (people.cn 2018). The problem has been stressed by Xi as the goal and driving force for learning. He said: "Once you have a problem in your brain which you want to solve and find a good solution, you will begin to learn automatically." Problems can be detected through multiple sources, including reviewing past experience and lessons, investigation and research, and information provided by the general public. Xi also mentions the learning contents, which include books, practice and investigation, the general public, experts and scholars, and international experiences. The five main contents are interrelated and complimentary. Book reading provides the initial theories, field visits and investigation helps to collect new knowledge and experience, communication and attention helps to learn about the local folks' views, new concepts and thinking should be learnt from experts and scholars, and international experience and practice should be learnt with reference to the local situation and real decision-making need (Shang 2018). In his plain language, Xi describes his basic framework of meta-learning and prescribes how the Chinese policy-maker can learn about learning itself.

Xi emphasises two strategies for achieving effective learning: 1) integration of

learning and reflection, and 2) utilisation-focused learning. He considers reflection as a way to internalise knowledge and sustain learning, for he said: “learning without thinking leads to confusion” (Shang 2018). This interactive relationship between learning and reflection is noted by Argyris & Schön, who consider single-loop learning as the result of reflection on human action and double-loop learning as the result of reflection on the norms, values and social relationships underpinning the human action. For utilisation-focused learning, practice guided by knowledge learnt is regarded as key indicator for learning effectiveness. Practice is both the end and means of learning in Xi’s learning theory. This corresponds to Argyris & Schön’s action theory. People have two sets of values and skills in dealing with the others, namely espoused theories of actions and theories-in-use. The former refers to values and skills they are conscious and aware of, while the latter refers to the actual theories behind our daily behaviors. In single-loop learning, people tend to use their own reasoning without testing it, so they tend to defend their positions and conceal the errors (Model I theory-in-use). In double-loop learning, the reasoning process itself needs to be learnt and improved, and people advocate their position and combine with inquiry and public testing to achieve effective problem solving (Model II theory-in-use) (Argyris and Schön 1974; Argyris 1995; Schön 1983, 1987).

This thesis will try to review a handful of cases in the health sector and examine the development of methodology for meta-learning by applying the theoretical framework provided by Argyris & Schön’s deuterio-learning theory.

1.5.3 What is the role of thinktanks in meta-learning?

The thinktank’s role is stated in developing the Chinese learning state. In 2013 the State Council defined thinktank and its role in deepening economic and

social reforms. Thinktanks at national and subnational level mushroomed. For instance, the Chinese government has invested in building national capacity for health systems research, and health systems researchers have played an important role in supporting implementation and learning of health reforms in recent decade.

Since the launch of the new round of health system reform in 2009, trillions of dollars have been pumped into the health system strengthening and development. There is a trend of searching for and maximising values in health, which is accompanied by rising interests and demands for evidence and knowledge for decision-making. Various evidence production agents have mushroomed recently, including government and non-governmental thinktanks, research institutions, universities, professional societies, and consultancy firms, etc. Research projects and funding at all levels have seen rapid increase. The CNHDRC's annual number of projects increased 10 times in 5 years' time, and annual research budget increased fivefold.

From the perspective of the CNHDRC, a leading health thinktank in the country which the author belongs to, the thesis analyses a series of case studies conducted by the CNHDRC researchers. It also discusses the thinktank's role in supporting such meta-learning process.

1.6 Case study method

Theory is when you know everything but nothing works. Practice is when everything works but nobody knows why. We have put together theory and practice: nothing is working... and nobody knows why!

Albert Einstein

For a long time, the obsession with causality in health and other development areas has led to ignorance to underlying trajectory of change. However, methods of randomised control trial (RCT) or quasi-experimental designs are rarely possible in developing countries and complex environments. What is more, impact is not monotonic and linear as assumed in many quantitative studies. In most cases, a quantitative approach fails to distinguish design failures from implementation failures. Mixed method which combines qualitative approaches to quantitative studies is proposed as a solution to these problems (Bamberger, Rao, Woolcock 2010). Weaknesses of the quantitative approach can be overcome by applying qualitative techniques such as participant observation, interview, focus group to assess the process of implementation and how this affected program outcomes and impacts. Compared with quantitative methods, qualitative methods are better suited to study new ideas and explore complex phenomena (Minichiello et al., 2004). In addition, mixed methods also have other advantages, such as bringing multi-dimensional perspective, and increasing external validity of statistical analysis results (Byrne 2013; Dellinger & Leech 2007).

With amassing evidence, the most pressing question for decision-makers in developing world has changed from *what works* to *how can it work*. As a result, evaluators and researchers are forced to come up with more innovative design of evaluation, to meet the decision-making demands. Some evaluators and researchers of development programs propose some applied framework

for assessing the external validity of complex interventions, suggesting that the framework shall integrate design elements, implementation dynamics and context compatibility (Harding and Woolcock, 2012). In addition to design, they propose to build an explicit theory of change, define complexity, and understand implementation and contexts.

Case study methods are considered to be most helpful as the first step to generating knowledge about an unknown or complex phenomenon (Yin 2004), help knowledge development at any level (Gerring 2007), and can be paired with complexity theory to study systems (Anderson et al., 2005). In evaluating development projects, many evaluation practitioners propose the use of case studies for supporting decisions on generalising and mainstreaming local knowledge (Mendoza Alcantara & Woolcock 2014). For one thing, they argue that case study as a method is above the old quantitative/qualitative divide, since it encompasses both methods. For another, case studies have stronger capacity in offering integrated analysis of agents, activities, mechanisms, outcomes in specific contexts. The case study approach is perfect for realist evaluation, in which the focus is to explore and explain variance, and identify what works for whom under what conditions (Pawson and Tilly, 1997). Case studies can also be a good source for extrapolation (Barzelay 2007).

Argyris and Schön extensively use cases in illustrating their studies of learning (Argyris 1982). For the thesis, the main parts present a series of different types of case studies on learning China's approach to evaluation and policy learning. Through single case studies and cross-case analysis, key learning themes and points emerge and combine. The case study approach helps to generate common understandings of the meta-learning mode taken by the Chinese health policy actors, to examine methodological tools employed, and to discuss the role of the think-tank in supporting such learning.

1.7 Papers in the thesis

Eight papers are included in the thesis (Table 1 - 4). The first two papers in Chapter 2 examine the nature of the policy process in China, identify the role of learning in the process, and analyse the general context for the happening of such learning. The first case sets the scene of the typical health policy making and reform style in China, describing the nature of the generic procurement reform design and implementation; while the second case captures the initial attempt of the CNHDRC in interpreting findings from conventional summative/formative evaluation to developmental evaluation. The chapter finds that against the complex background of decentralisation of the healthcare services, the policy system in China is characterised by high levels of discretion on the part of implementing units (sub-national governments, local health bureaus, hospitals, and the like) which are on the front line of management of many health reforms. A unique iterative “3 E” (experiment, experience, expand) approach to health reforms and policy making has been adopted in China. Policy implementation is regarded as a complex adaptive system. Innovations and bad performance can both be possible, depending on the local leadership, interpretation of the policy, and initial responses to the policy. In such a complex situation, a real-time knowledge feedback mechanism through evaluation and learning is needed to avoid big risks and mistakes. The central government’s learning ideology has provided a conceptual framework for understanding the learning approach delineated in the case studies. It not only focuses on the double-loop learning—learning of the mechanism and theory of changes behind various reforms, but examines the possible values, variables, and tools for achieving that learning.

The three papers in Chapter 3 present how learning about the learning

process is taking place in a rapidly changing and complex context, and how the thinktank is consciously designing, testing, and facilitating such a learning process. To better understand the learning about policy learning in China, the cases respectively discuss developmental evaluation for interpreting the essential drug policy, utilisation-focused evaluation for developing indicator system of the 12th Five Year Plan for Health, and multiple criteria decision analysis (MDCA) for designing the priority-setting process for disinvestment decision on the essential public health service. Through subnational experiment and innovation, and national and sub-national close interactions and information sharing, single- and double-loop learning happens in the complex health policy making and implementation process in China. In the central-local learning space, a trusted probe like CNHDRC — a national health thinktank affiliated to the national health authority is key for facilitating such a learning process. Evaluation approaches, as main tool for meta-learning of the process, are evolving as the Chinese thinktank becomes increasingly aware of its role in supporting such policy learning process, and in response to the increasing complexity of reforms. Learning from widespread innovation and experimentation is challenging, while learning about learning itself is more challenging, as it requires a different set of skills and tools, such as engaging learners and understand their needs, tease out hidden views of policy, and identify underlying norms and values of the policymaking approach. The ability of learning is strengthened through introducing, testing, and examining new methods and tools.

The final 4 papers discuss about what methodological approach and tools can be used to support the process. The first case deals with China's approach to the development of health technology assessment (HTA) and adaptation of rapid HTA in supporting the national decision on medicine and other technology such as costly medical devices. It shows that the CNHDRC's efforts in setting up HTA system and exploring applicable process and tools for supporting the decision making. The next three cases share a common

theme—priority setting of research, policy making, and policy implementation in maternal and child health. They document the attempt of the CNHDRC's exploration of the methodological approach to priority-setting and relevant tools. It shows that the CNHDRC has actively built a structured learning process and developed tools for improving policy learning. Such a meta approach to whole cycle of policy learning—from research stage, to policy making, and to policy implementation -- demonstrates a conscious and active altitude to improving learning ability and competence, as well as revealing key policy actors' genuine interests in participating and contributing to the learning about the learning process.

Table 1 - 4 Chapters and papers in the thesis

Chapter	Papers included	Level	Study type	Policy setting	Methods
2: The nature and main mode of learning in China	Xiao, Y. Value-based medicine procurement reform in China	National	Evaluation	Medicine procurement	Qualitative case study
	Xiao, Y et al. Evaluation and learning in complex, rapidly changing health systems: China's management of health sector reform. <i>Globalization and Health</i> (2018) 14:112. https://doi.org/10.1186/s12992-018-0429-7 .	Sub-national	Evaluation	Medical rehabilitation service delivery, family planning service and maternal and child health (MCH)	action research case study
3: How does learning take place?	Xiao, Y. K. Zhao, David Bishai, David Peters. Essential drugs policy in three rural counties in China: What does a complexity lens add? <i>Social Science & Medicine</i> . Special Issue on Complexity. 2012 (10)	County	Evaluation	Essential medicines	Action research case study
	Conceptual indicators framework for strengthening the Chinese health system		Evaluation of the five-year plan for health		Qualitative case study
	Explicit priority setting of the national package of essential public health services	National	Priority-setting of national essential care	Public health service	Action research case study
4: What tools can be used to support the	Xiao Y., et al. Rapid HTAs in China. <i>International Journal of technology Assessment in Health care</i> .	National	Health technology assessment	Essential medicine and medical technology assessment	Action research case study

process	Maternal and child health research priority setting in Western China	Regional	Priority setting of health research	Maternal and child health	Qualitative case study
	Cost-effectiveness analysis of high impact child survival strategy in China	National	Evaluation (cost-effectiveness analysis)	Maternal and child health (MCH)	Quantitative case study
	Situational analysis of the Safe Newborn Project in 20 rural counties in China	County	Pre-evaluation of a national pilot	Child care	Mixed qualitative and quantitative case study

Chapter 2: Learning about the learning process in the Chinese health sector

The chapter deals with research question one, namely “What is the policy meta-learning in China?” To be specific, it examines the nature of the meta-learning process, and seeks answers to the following questions:

- 1) What is the level of learning? (single-loop or double-loop learning; individual, organisational, or system level)
- 2) Who learns and who teaches?
- 3) How does environmental factors condition learning?
- 4) What is the context in which learning takes place?

As presented in the introduction, China’s adaptive and evolutionary policy making style shapes its policy learning approach. With the central government’s increasing attention to learning and reflective practice, it is consciously exploring ways of gaining learning abilities. The role of research and evidence in supporting the learning has been gradually recognised, explored, and expanded along with the deepening of the Chinese socio-economic reforms.

In the health sector, where large-scale radical and consecutive reforms have taken place recently, intensive policy learning and innovation has been documented. In a context of great complexity and uncertainty, why the Chinese government takes the learning as its main focus and why it chooses to focus on the meta level to strengthen that learning abilities are important questions for understanding the learning abilities of the Chinese government.

This chapter includes 2 cases. The first case is about the latest ambitious

attempt of the national government in tackling price control and procurement of generics; while the second discusses the Chinese health policy learning and innovation with reference to two major reforms in recent years. The former case sets out the scene of the typical national health reform, and stepwise experiment and implementation. The later depicts active and intensive learning and innovation in the top-down policy implementation and experiment process. Both cases describe rich interactions between multiple policy actors at national and subnational levels, and central role of evaluation and research in supporting the single- and double-loop policy learning process.

Two cases show that the policy system in China is characterised by continuous experiment and learning, and high levels of discretion on the part of implementing units (sub-national governments, local health bureaus, hospitals, and the like) which are on the front line of management of health reforms. In the context of great uncertainty and complexity, the central government usually develops open or semi-open policy framework and asks local provinces to experiment with innovative models. Local adaptation is common, and even expected or encouraged, to collect useful information to sustain the continuous policy process. Innovations and learning are constant theme for the Chinese health reforms.

Case 1 sets out scene of a large reform and describes all key features of the policy process in China, such as political fragmentation and decentralisation of essential public service provision, incremental and experimental approach to major reform in a context of great complexity and uncertainty. Case 2 describes how single- and double-loop learning happened at the same time, and how meta-learning of such policy learning might be possible with the facilitating role of the thinktank and its researchers. The evaluator first used the conventional method to evaluate the rehabilitative care pilot in 7 cities

initially (single-learning), but confused by the undetermined result. Then they turned to the realist evaluation and examined the contextual factors and underlying mechanisms reform in line with the outcome (double-loop learning). Progress checking and examination of the governing variables of the reform itself seemed to be achieved in one go. The researchers not only tested the use of a new methodology, but began to understand the novel role of the evaluation in facilitating learning between the central government and implementation units at subnational level.

In the process, vibrant exchange of information and multiple learning at individual, organizational and system level happened at the same time. For instance, at individual level the evaluators learned the local implementation progress and main issues from the doctor and patient, while the national and local decision-maker learned better about the reform policy and the theory behind through the investigation conducted by the researchers. At the organisation level, relationships and reciprocal influence between government agencies and health facilities at national and subnational level were revealed and potential impact on the reform studied. At system level, the realist evaluation results of the medical rehabilitative care reform helped the national government to capture the rich details of local reality, and feed useful information to the next round of decision-making.

In the learning process, contextual factors, such as geographic, socio-economic, key local implementer's interpretation of the national policy, and power-relationship between local actors obviously conditioned that learning.

2.1 Value-based pricing and procurement of essential generics

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the webpage of the Center for Global Development

<https://www.cgdev.org/global-health-procurement-background-research>

Abstract

On its way to universal health coverage and a “Healthy China”, China is pursuing good value for health, and has launched national reforms on centralizing drug procurement. “4+7” drug procurement reform represents the national government’s latest ambitious attempt to contain drug costs by reducing prices and encouraging generic drug use and improving the availability of quality and cost-effective products. Following completion of the first and second stage—including selection of the drugs and national bidding for suppliers and promoting implementation in public hospitals—the reform shows initial success in driving huge price cuts and reshaping the quality-volume-price balance of the drug market. However, as the largest nationwide drug procurement reform, it is complex and will impact multiple actors, calling for more profound institutional changes and well-concerted coordination among government agencies. Although it is still too early to fully assess the results, the procurement reform has strong political commitment, wide involvement of key stakeholders, and huge potential market impact and

will certainly shape the future of the Chinese drug market. Looking ahead, policymakers should consider HTA-informed drug selection and price negotiation, close coordination and cooperation of key policy stakeholders in enforcing implementation, and proactive policies and countermeasures for anticompetitive or monopolist behaviors.

2.1.1 Value-based healthcare and essential drugs reforms in China

On its path to universal health coverage (UHC), China has launched radical health reforms to improve access and affordability of essential care dating back to 2009, including essential drugs and public health services. With massive investment in healthcare reforms, total health expenditure has increased rapidly with a double-digit growth rate exceeding that of the gross domestic product (GDP). Total drug spending more than doubled, growing from 754.38 Billion Yuan (110.45 Billion USD) in 2009 to 1820.3 billion Yuan (268.76 billion USD) in 2017, accounting for 34.42% of total health expenditure.

The focus of reforms has gradually shifted to align with the concept of value-based healthcare since 2012, in order to contain costs and better address various health needs. Supply and provision of essential drugs has been stressed as a key measure to address cost escalation. The main reforms launched included full coverage of essential drugs in the primary care setting, “Zero markup” for suppliers, pricing reforms, and centralized procurement. Although, the percentage of drug costs in the total health expenditure dropped from 40.63% in 2009 to 34.42% in 2017, overall achievement has been modest and multiple issues related to the supply and provision of truly cost-effective essential drugs remain.

Since 2001, reforms to centralize drug procurement reforms have been

launched and expanded, alongside a series of national drug reform policies¹. These policies reflect the Chinese government's attempts to restructure the drug procurement process. The previous reforms on centralized drug procurement, mostly initiated by the provincial and national health authority, had stressed several aspects, namely the negotiation of lower prices in exchange for minimum procurement quantities, better planning of facility procurement, transparency of the procurement process, and accountability of drug delivery. However, due in part to misalignment or poor coordination of drug quality, pricing and payment policies, the high level of autonomy of the public hospitals, and the variable quality of generics (especially domestically produced ones), previous policies have achieved limited success.

Recent years have seen pioneering efforts around price negotiation and procurement initiated by public payers. Shanghai Municipality and Sanmin City (Fujiang Province) are two outstanding examples, that have successfully implemented payer-oriented reforms.

Existing procurement challenges in the country are complicated by multiple transitions: the economic downturn, the strengthening of public service accountability, the epidemiological transition, the evolution of health systems organization, and deepening of health reforms designed to support the country in its journey towards UHC. Successful procurement reforms depend on key goals such as achieving drug supply security, containing costs, and promoting both domestic research and development capacity as well as

¹ Main national policies issued: Draft Guideline of Centralized Drug Procurement in Health Facilities (Weiguicaifa [2001]308), Opinion of Standardizing the Centralized Drug Procurement in Health Facilities (Weiguicaifa [2009]7) & Appendix (Weiguicaifa [2009]59), Notice on the Issuance of the Centralized Drug Procurement in Health Facilities (Weicaifa [2010]64), the State Council Office's Notice on Establishing and Standardizing Essential Drug Procurement in Government-sponsored Primary Health Facilities (Guobanfa [2010]56), the State Council Office's Notice on Improving the Centralized Drug Procurement in Health Facilities (Guobanfa [2015]7), the State Council Office's Opinions of Further Improving Production, Circulation and Utilization of Drug (Guobanfa [2017]13).

access to and affordability of essential drugs.

In 2016, the Healthy China 2030 Plan was launched, with a clear focus on patient-centered, value-based healthcare. Since then, there have been more intensified efforts in making decisions more evidence-based and value-informed decisions. Particular highlights include the establishment of a national health technology agency in 2018, the institutionalization of evaluation and assessment tools in the health decision-making process, conducting of generic quality consistency evaluation (GQCE)² by the National Medical Products Administration (NMPA), and the pooling of care purchasing power through the creation of the Chinese National Health Insurance Bureau, which will supervise health insurance across both urban and rural populations. Against the background, a national generic procurement reform has been launched. By defining the minimum quantity, the reform aims to effectively lower the price of quality generics and improve drug supply security in the country.

2.1.2 “4+7” drug procurement reform

In June 2018, the National government in China decided to launch a new round of drug pricing and procurement reform. After the issuance of the National Pilot Plan of Centralized Drug Procurement, the initial procurement of 31 generics was implemented in 4 municipalities (Beijing, Shanghai, Tianjin and Chongqing) and 7 cities (Guangzhou, Shenzhen, Xi’an, Dalian, Chengdu, Xiamen). This reform was coined the “4+7” procurement reform.

Principles of the procurement reform are defined as the following: 1) organization by the national government; 2) procurement implemented by the

² In March 2016, the National Drug Administration has launched the program on generic consistency test (GCE) after issuance of the Opinion on Conducting Consistency Evaluation of the Quality and Efficacy of Generic (Drugs Guobanfa [2016]8).

alliance formed by the pilot cities; 3) all transactions performed on the online platform.

Different from previous pilots, this “4+7” reform is aimed to restructure generic procurement in the country with the unprecedentedly high political commitment, with particular focus on the quantity guarantee, concurrence and consistency of national-level bidding, local-level procurement and hospital-level purchasing and prescribing, and payment and other incentives for procurement enforcement (Table 2 - 1).

Table 2 - 1 Comparison of the "4+7" reform and previous reforms

	The “4+7” reform	Previous pilots
Leadership	The State Council	Municipal/provincial government, or regional government alliance
Scale	Nationwide	Municipal/ provincial/regional level
Initiator	Payers, with support of regulators, health administrators	Local/provincial/national health authorities
Implementers	All the public hospitals at primary, secondary and tertiary level	All the public hospitals at primary, secondary and tertiary level
Price	Huge price reduction based on the guaranteed national purchasing	Moderate price reduction, and sometimes price rising after procurement
Quantity	Predefined national minimum quantity, and quota for public hospitals	Quantity depends on the specific facility
Payment	Minimum 30% prepayment by the payer;	Varied depend on the local budget;
Incentives	Compensation, performance assessment	Compensation, performance assessment
implementation	Procurement and facility-level purchasing is unified in the same process; payment tariff is the same as the procurement price	Procurement and facility-level purchasing is separate; hospitals can decide if they will purchase the product

A working group is set up to coordinate the pilot, which is led by the State

Council. Representatives of the national health payer, administer and regulator participate. Under the working group, the Joint Procurement Office (JPO), the procurement alliance formed by the representative of the procurement agency in the pilot cities is established to oversee the bidding and procurement process (Figure 2 - 1). JPO is hosted by the Sunshine Medical Procurement All-In-One³ (the local drug, diagnostic and device procurement agency in Shanghai) (Figure 2 - 2).

This reform is implemented mainly by the National Health Insurance Bureau (NHIB), a newly established agency dating to early 2018, which has a mandate for pricing and procurement of drugs and disposables. The National Health Commission (NHC) will support the reform by introducing policy that encourages purchasing and prescribing of the selected drug, and by managing the provider's behavior. The National Drug Administration is responsible for the quality assurance of the drug.

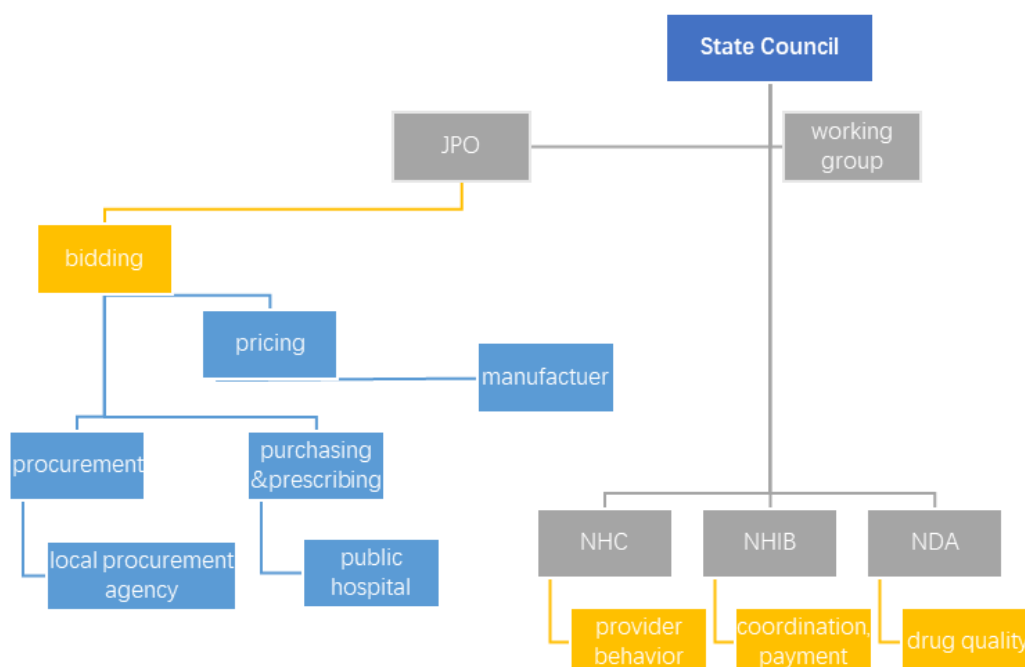


Figure 2 - 1 Organisational structure of the "4+7" reform

³ <http://www.smpaa.cn/>.



最新资讯	4+7城市药品集中采购
[置顶][2-2]关于“全面实施药品挂网公开议价采购”等有关事项... 2019-02-02	[1-28]我国统筹推进国家组织药品集中采购和使用试点落地... 2019-01-28
[置顶][1-3]关于“全面实施药品挂网公开议价采购”等有关事项... 2019-01-03	[1-18]国新办举行国家组织药品集中采购和使用试点工作吹风... 2019-01-18
[置顶][9-30]关于全面实施药品挂网公开议价采购的通知 2018-09-30	[1-17]国务院办公厅关于印发国家组织药品集中采购和使用... 2019-01-17
[置顶][8-30]关于本市开展抗癌药专项集中采购的通知 2018-08-30	[1-11]韩正出席医疗保障工作座谈会并讲话 2019-01-11
[12-25]关于“全面实施药品挂网公开议价采购”等有关事项... 2018-12-25	[12-17]关于公布4+7城市药品集中采购中选结果的通知 2018-12-17
[11-11]关于调整部分药品纳入本市医保支付后协议采购价的... 2018-11-11	[12-8]关于国家组织药品集中采购试点答记者问 2018-12-08
[9-25]关于调整部分药品纳入本市医保支付后协议采购价的... 2018-09-25	[12-7]孙春兰出席国家组织药品集中采购和使用试点工作部... 2018-12-07
[9-18]关于调整部分药品纳入本市医保支付后协议采购价的... 2018-09-18	[12-7]4+7城市药品集中采购拟中选结果上海地区配送企业公... 2018-12-07

Figure 2 - 2 The JPO function on the SMPA website

All the initially selected drugs were those generics passed GQCE by the time of pilot planning and their reference originators. After review and discussions, several drugs were dropped for various reasons such as the non-applicability of the drug for mental illness, and finally 31 drugs were selected. The assumption is that these drugs have a quality and efficacy guarantee provided by the national drug regulator. All the drugs are main formulation, and 90% are oral form.

The bid is open to all the manufacturers registered in the mainland. The pilot cities were major cities located in the western, central and eastern regions in the country, which were chosen based on market share, procurement capacity, and previous reform experience. More importantly, these cities are willing to take risks and move ahead with the drug procurement reform.

1. Implementation process

The pilot program has its own plan and framework (Figure 2 - 3). It is planned as a 3-stage process: 1) bidding, 2) procurement implementation, and 3) evaluation. By the time of the paper writing, it has completed the bidding process, moved on to procurement implementation, and evaluation.

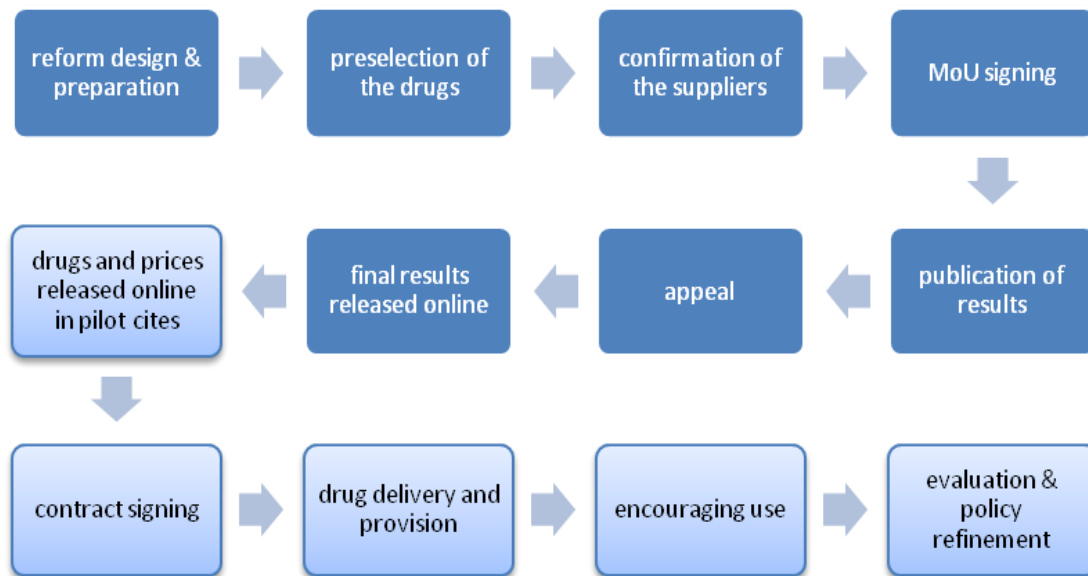


Figure 2 - 3 The implementation process of the "4+7" drug procurement reform

Note: All completed activities are in dark blue, while the unfinished are in pale blue.

(1) Reform design and preparation

In June 2018, the reform was decided in the meeting of the Health Reform Steering Committee of the State Council. After field survey and discussions with key stakeholders organized by the NHIB, a national reform plan was formed and approved by the State Council in July. The Joint Procurement Office (JPO), the designated public procurement agency was established, and it oversaw the development of the procurement plan and process in August and September. On 15 November 2018 the JPO published its Paper on Centralized Drug Procurement in "4+7" Cities, initiating the open tendering process. On December 6, the initial bidding was opened in Shanghai, signaling the end of stage 1 (Figure 2 - 4).

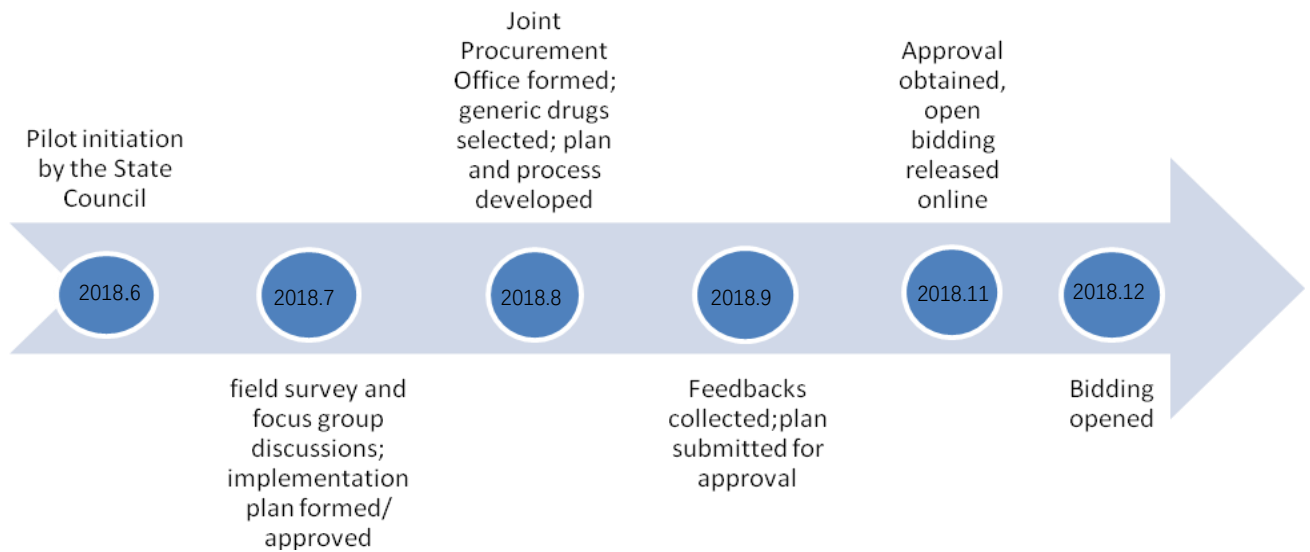


Figure 2 - 4 Timeline of the 1st stage of the "4+7" drug procurement reform

(2) The bidding process

The bidding process became a 2-step process (Figure 2 - 5). For each drug, the lowest bidder will become the "preliminary candidate". If two or more companies offer the same lowest price, the JPO will determine which one becomes the preliminary candidate on the basis of assessing each company's capacity to meet the minimum quantity requirement on the basis of annual production and sales. The company that offers the second lowest price will become the backup candidate in case the preliminary candidate cannot satisfy the quantity requirement. In the second stage, the JPO will decide whether it accepts the preliminary candidate's offering price. If three or more companies have tendered during the first stage, it is considered competitive. The JPO will generally accept the price and the tender will end by awarding the contract to the preliminary candidate. If only one or two companies have entered the tender, the JPO will compare the reduction in the offered price from the lowest price at which the drug was sold in the 11 cities during the previous year. The biggest change from the current bidding mechanism is that originators directly compete with the generics, which is intended to drive the drug price down.

Under the “4+7” drug tendering system, a company is provided with a substantial quantity guarantee. The 11 pilot cities make up nearly one-third of the national market. The minimum quantity represents 60% of the total sales of the drug in the pilot cities. That means that the total quantity guarantee is around 20% of the national total.

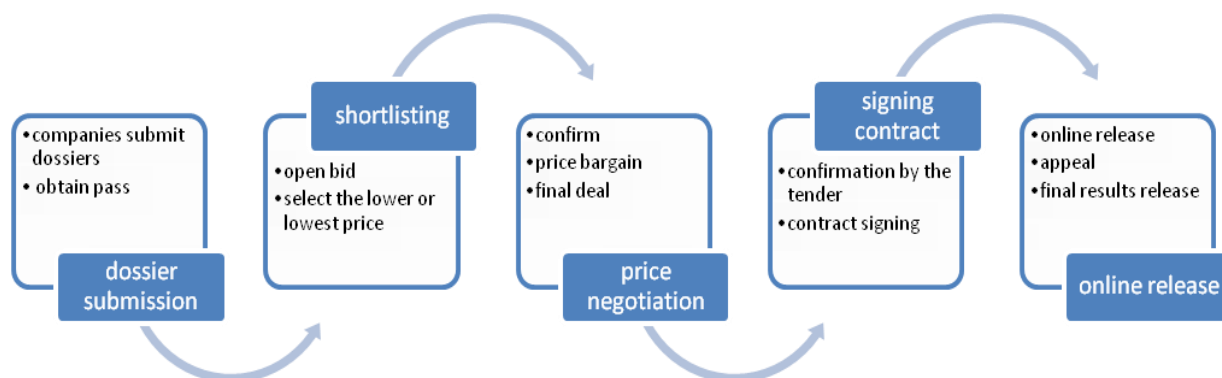


Figure 2 - 5 Bidding process of the "4+7" drug procurement reform

(3) Procurement implementation

Shanghai Municipality has been chosen as a pioneer in the nationwide pilot. The Drug Procurement Information (the designated online information platform) of the Shanghai Municipality released the amendment document on implementing the “4+7” drug procurement reform two weeks after the national bidding. The policy says that the purchasers will pay 50% of all drug costs to the designated distributor within 5 working days after the tri-party contract signing. The initial payment will be made mainly by the public health insurance funds at the local level. As required by the national policy, initial payment has to be no less than 30% of the total payment. Another 45% of payment will be paid half year after the procurement implementation or the total quantity reaches 50% of the total quota defined in the contract. At the end of the drug supply period, the purchasers will pay all the rest.

To ensure the use, the Shanghai government will adopt quality assurance measures, ensuring supply and delivery, promoting drug use in the hospital by simplifying purchasing procedures and incentivizing prescription.

After initial pilot in Shanghai, the State Council issued the Pilot Plan of National Centralized Procurement and Use (Guobanfa [2009]2) on January 17, 2019. The associated reform documents will be issued by the JPO soon, and procurement contracts signed between the JPO and the selected suppliers by the end of February 2019. Formal procurement in the pilot cities is supposed to be launched in March 2019.

By the time of releasing the report, all 11 cities have issued their own implementation plans, some of which give details on coordinated actions between the payer, provider and regulator. However, some analysts doubt the feasibility of some of the measures proposed.

(4) Evaluation

The pilot is ongoing, and a research team of the Peking University Health Science Center is commissioned to conduct an evaluation, though the results are unreleased. As the other large social reforms in the country, the “4+7” drug procurement reform is taking a typical experimental approach. As test beds for the formation of the national policy on centralized procurement, pilots in different cities will surely be followed and researched by the national government and other key policy stakeholders. The second round of the reform is planned to be launched mid-2019.

2. Preliminary results

25 out of 31 generic drugs were selected, of which there are 3 original drugs

and 22 generics. All the generics have passed GBQCE. Compared with the lowest prices in the pilot cities in 2017, the average price cut was 52%, and the highest price cut was 96%. The prices of 6 drugs are much lower than that in the US market, of which the entecavir (30 tablets, 500 microgram) for hepatitis B has the biggest per unit price gap (US\$ 0.09 per tablet compared to US\$ 10.93 in the US⁴ and US\$15.84 in UK⁵). Based on the assessment of the NHIB, 10%-20% further cuts of the drug prices could be achieved, though it recognized that the current prices are already very low. Nearly 0.85 billion USD would be saved with procurement of 25 drugs from the payer's perspective, and the savings will be enormous with scale-up of the reforms to the other non-pilot cities.

20 drugs have only one specification, while 11 have 2 specifications. 25 specifications were subject to 2 tenders, 16 specifications to 3 or more tenders, and one specification has only 1 tender. The 1-tender drug saw a 29% price cut, 2-tender drugs had an average price cut of 56% (26%-87%), while the 3-tender drugs on average achieve a 50% (16%-96%) price cut. Most multi-nationals offered 10%-30% discounts in the initial tendering process, and some even pulled out when seeing incredibly low prices offered by the Chinese drug manufacturers. As a result, the majority of the listed suppliers are domestic companies with relatively large capacity. Huge repercussions were created on the pharmaceutical industry, and the domestic stock market for pharmaceuticals suffered a loss of 44.2 billion USD in the first 2 days after the bidding. To stabilize the market, NHIB held a meeting on December 26 to clarify some of the confusions.

⁴ https://www.goodrx.com/entecavir?dosage=0.5mg&form=tablet&label_override=entecavir&quantity=30.

⁵ <https://www.nice.org.uk/guidance/ta153/chapter/2-The-technology>.

2.1.3 Discussions

The “4+7” drug procurement reform is an attempt to achieve well-coordinated drug provision, through pricing, procurement and payment policies initiated by the payer. Generics are to be promoted in the Chinese market. Prices of originators and generics will be further cut to ensure affordability of essential drugs.

Based on the national pilot plan, China will expand the program to cover more cities and drugs. Quality assurance measures will be forcefully implemented by the NMPA to guarantee safe products. Performance assessment mechanisms will be established by NHIB and NHC jointly, with the participation of hospitals, physicians, and third-party evaluation agency. Close partnership and coordination among key policy stakeholders is required, especially between the NHIB, NHC, and NMPA.

In future reforms, three issues will need to be addressed:

Firstly, product selection and pricing is the cornerstone of drug procurement. The initial selection and bidding of the 31 drugs was not systematically informed by evidence. Experts and some key decision-makers are concerned about the surprisingly huge price cuts and doubt the rationality of domestic companies' initial responses to the reform. The national policy-makers need to consider reasonable drug selection and pricing mechanisms with inputs from health technology assessments in future. With the establishment of the National Center for Medicines and Health Technology Assessment, the national government is institutionalizing HTA in the health policy-making process, with drug assessment as a main pilot area. 2018 saw NHIB's initial trial of conducting cancer drug price negotiations with the input of cost-effectiveness evidence. We believe HTA will play a decisive role in future

pricing and procurement of health commodities, and contribute to the pursuit of value-based healthcare.

The second is to ensure pilot implementation. Two types of implementation mechanisms need be established, including incentives through new payment arrangements, and enforcement mechanisms such as contract management, accountability enforcement, and performance assessment in public hospitals. Adoption of these mechanisms calls for joint action of multiple policy-making bodies: to name a few, the NHIB (rule setting and coordination), NMPA (drug quality), National Health Commission (monitoring and supervision of actual use), and Ministry of Industry and Information Technology (drug trade and distribution).

The third issue is the generic drug industry's consolidation as the nationwide rollout proceeds. It is believed that the reform will drive small Chinese enterprises with irregular performance or inferior production capacity out of the market, and push more pharmaceutical companies towards innovative drug research and development. In the process, the government should build up pre-warning systems or alerts for monopolies and anticompetitive behaviors, and consider possible countermeasures or proactive policies.

However, the plan for national rollout is not yet clear. The pilot is changing the main actors' power, interests, and relationships. Based on media coverage, industry actors, including manufacturers of originators and generics and of national and international origin, are concerned. Doctors are worried about limitations on choice and patients' reactions. With barely adequate procurement capacity, local governments, especially those in non-pilot areas, are worried about the quality and production capacity of the listed generic manufacturers.

2.1.4 Conclusions

On its way to UHC, China is launching national reforms on centralizing drug procurement. “4+7” drug procurement reform represents the latest ambitious attempt of the national government to contain drug costs by reducing prices, encouraging generic drug use, and improving the availability of quality and cost-effective products.

With the completion of stage one of the reform—selection of the drugs and national bidding for suppliers—the reform shows initial success in driving huge price cuts and reshaping the quality-volume-price balance of the drug market. However, as the largest nationwide drug procurement reform, it is complex and will impact multiple actors, calling for more profound institutional changes and collaboration and coordination among government agencies.

Although it is still too early to make final judgments of the results, the procurement reform has strong political commitment, wide involvement of key stakeholders, huge potential market impact and will shape the future of the Chinese drug market. With the launch of the national HTA program, more discussions and explorations about value in health can be expected in near future.

2.2 Learning and innovation in complexity: China's management of health sector reforms

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Abstract

Healthcare systems are increasingly recognised as complex, in which a range of non-linear and emergent behaviours occur. China's healthcare system is no exception. The hugeness of China, and the variation in conditions in different jurisdictions present very substantial challenges to reformers, and militate against adopting one-size-fits-all policy solutions. As a consequence, approaches to change management in China have frequently emphasised the importance of sub-national experimentation, innovation, and learning. Multiple mechanisms exist within the government structure to allow and encourage flexible implementation of policies, and tailoring of reforms to context. These limit the risk of large-scale policy failures and play a role in exploring new reform directions and potentially systemically-useful practices. They have helped in managing the huge transition that China has undergone from the 1970s onwards. China has historically made use of a number of mechanisms to encourage learning from innovative and emergent policy practices. Policy

evaluation is increasingly becoming a tool used to probe emergent practices and inform iterative policy making/refining. This paper examines the case of a central policy research institute whose mandate includes evaluating reforms and providing feedback to the health ministry. Evaluation approaches being used are evolving as Chinese research agencies become increasingly professionalised, and in response to the increasing complexity of reforms. The paper argues that learning from widespread innovation and experimentation is challenging, but necessary for stewardship of large, and rapidly-changing systems.

Key words: Healthcare system, Change management, Innovation, Learning, Policy evaluation, China

2.2.1 Introduction

An increasing body of research attests to the complexity of health systems, and argues that managing change requires approaches that take into account system complexity, context and implementation processes (Marchal et al. 2014; Snowden 2011). Over the reform period, from the 1970s onwards, Chinese policymakers have encouraged sub-national innovation in many policy areas as a means of exploring practical and innovative approaches, with the hope that learning from widespread and often relatively unscripted experimentation will help guide the reform process. As a corollary to this process of eliciting innovative practices, mechanisms are needed that can help central policy makers identify and understand emerging practices, their potential usefulness, and the extent to which they can or should be propagated. This kind of process confronts the question, posed by Dani Rodrik, “We shall experiment, but how shall we learn?” (Rodrik 2008). This is a particular challenge for China, given its size, the multiple ways that

implementing jurisdictions may vary, and the limits to knowability of what may work, how, and why, in advance of actual implementation.

In this article we use case examples to show the role of a government think tank, the China National Health Development Research Centre (CNHDRC), in supporting system-level learning from dispersed policy practice in the context of rapid change. It explores how interactions between researchers/evaluators and decision-makers at various levels can ensure that studies contribute to effective policy steering.

2.2.2 Evaluating health policy implementation and innovation in China

(1) Health policy implementation and innovation

Sustained adaptation since the beginning of market-oriented reforms in the late 1970s has transformed China from a poor, predominantly rural, country into an increasingly urban society, with a larger and more diverse economy, higher incomes and improved nutrition, health and welfare indicators (Ji 2017). China's government system combines central government leadership with highly localised policy implementation and management of reforms (Husain 2015). While policy implementation in China has been studied for many years, the study of policy experimentation and innovation has recently received increasing prominence as a possible explanation of China's ability to manage large-scale system adaptation over time and improve population welfare (Heilmann 2015; Ang 2016).

China's government system spans many levels, from central government and line ministries (including agencies responsible for health) through provinces,

cities, counties, towns/townships and villages. Cities and counties have a very important role, despite their relatively low position within the government system, and many decisions are decentralised to these levels, including much day-to-day planning and management of health and welfare systems (Carrillo & Duckett 2011). In many respects, this is simply a reflection of the challenges of managing a vast system: China has almost 3000 counties, and a large number of cities, which vary a great deal.

Decision makers have made a lot of use of experimentation and innovation in the management of reforms, including in the health system. This article uses a vocabulary of 'reform' to underline the institutional nature of processes underway – reforms to the health system require adjusting the roles and behaviours of a wide range of institutional and individual actors to advance towards hoped-for outcomes, such as a better functioning health or welfare system in a context of a rapidly changing context (Meessen & Bloom 2007; Bloom & Wolcott 2013). Relatively controlled experiments may be combined with use of 'open' policy frameworks by central/provincial government in multiple rounds of change to foster adaptation, learning by doing, and innovation (Husain 2017). Faced with the pressing need to reform and adapt, this approach has the potential to reduce the risk of large-scale policy failure.

'Experimentalism' has roots in China's early twentieth century experience, but has been commonly used since the beginning of market-oriented reforms in the 1970s (Heilmann 2008). It is hoped that experimentation and the fostering of innovation can engage the initiative of sub-national governments and departments in widespread problem-solving, although a degree of implementation failure and deviation is an inevitable side-effect (Chung 2000). In the health sector, the Chinese government has frequently adopted an approach of "experiment, experience and expand" (3E) to allow local

governments discretion in policy adaptation, reform design and innovation (Xiao 2010; Xiao et al. 2013) and legitimise and encourage local initiative within certain, often loosely-set, parameters (Husain 2017). The Chinese policy community employs an identifiable discourse of innovation, which characterises innovation as the use of new approaches to disrupt existing states, systems or patterns of behaviour to create new, emergent patterns and rules that can “sustain public welfare and properly motivate key stakeholders” (China Reform Newspaper May 8, 2012). This discourse also helps define the appropriate roles of central and local governments, in which central government defines the principles and foci of reforms, and local governments act as hands-on experimenters/innovators (Heilmann 2008), and enables signalling of emergent and potentially useful practices (Husain 2015).

(2) Evaluation as a decision-supporting tool in health system reform

Much has been achieved in reforming the Chinese health system, but much remains to be done. A recent report by the World Bank, WHO and the Government of China argues that more robust and systematic mechanisms are required for gathering information and learning to inform ongoing reforms (World Bank Group, World Health Organization, Ministry of Finance, National Health and Family Planning Commission, Ministry of Human Resources and Social Security, The People’s Republic of China 2016). The ‘open’ nature of many reform processes, the high degree of discretion given to local actors and the great range of starting points and possible dynamics in implementing jurisdictions, create challenges for the central government not just in understanding implementation successes/failures but, more profoundly, in understanding and learning from new/emergent institutions and practices that arise through this kind of semi-structured reform process. Learning from emergent practices becomes an important probe of how reforms are

progressing. Use of a label, such as 'innovation', is part of a signalling process of identifying emergent practices that may have value at a system level.

This great variation in emergent practices creates a need for mechanisms that can help policy makers identify and understand them and assess whether they can or should be promoted or propagated. There is a need to screen good practices from a range of emergent policy practices (Moore & McQuay 2006), uncovering 'positive deviants' (better than average practices in any given cohort) (Husain 2015), and assess the extent to which specific practices or innovations are likely to be of relevance, or reproducible, in other jurisdictions and therefore worth propagating – a question of external validity (Rodrik 2008; Craig et al. 2008). As Wagstaff et al. observed in the context of China's rural health insurance programme, "the policy of 'letting a thousand flowers bloom'...has much to commend it in terms of encouraging innovation, but it makes pinpointing the secrets of success very hard" (Wagstaff & Lindelow 2009).

The Chinese government has historically employed a number of practices and 'informational infrastructures' (McCann 2011) to promote intra-systemic learning, including research institutes with a mandate to provide policy-relevant research. The CNHDRC, formerly the National Health Economics Institute, is an example. It was established by the Ministry of Health in 1991 as a government think-tank. Its functions have evolved over time and in 2007, it set up a dedicated health policy evaluation and technology assessment unit. This has conducted a wide range of evaluations of pilot programs and policies, such as implementation of clinical pathways and payment reforms, medical pricing reforms, and the 12th Five Year Plan for Health. The CNHDRC has a mandate to inform national decision-making. Through ten years' experience, the CNHDRC has developed approaches to evaluation closely linked to the Chinese institutional context. The proximity of

the CNHDRC to stakeholders at both central and local levels has led to an understanding of the need to build relationships with key stakeholders and to a focus on utilisation, and end users, in its research and evaluation work. The following cases demonstrate how evaluation of new policies/reform initiatives has supported communication between multiple stakeholders, and facilitated system learning through intensified evaluator and end-user interactions. Looking retrospectively, approaches taken by the CNHDRC evaluators have resembled 'utilization-focused evaluation' (Patton 2008). Besides supplying hard evidence on implementation effectiveness, the CNHDRC evaluators' role has included that of facilitating learning and adaptive management approaches.

2.2.3 Case studies

This section describes two policy implementation studies carried out by the CNHDRC in which local governments had a lot of discretion and space for experimentation, to show how utilisation-driven evaluative thinking was used as a change management tool. Both studies were commissioned by the central health authority with the aim of understanding progress in implementation (successes and failures) and to learn from new/emergent institutions and practices arising in jurisdictions carrying out the reforms as a guide for national policy making. The investigators framed research questions to meet decision-making needs and also worked with the intended users to visit the pilot sites, allowing them to directly observe practices, and creating a platform for ongoing interaction between the evaluators and decision makers. This approach helped to uncover problems of implementation, and foster learning and information-sharing among key stakeholders, especially between local implementers and central policy-makers.

In both cases, the evaluators used multiple methods to probe new and

emerging practices and uncover the factors influencing their direction of development. This was combined with attempts to assess the effectiveness of these practices by employing quantitative methods such as cost-effectiveness analysis. Information channels and feedback loops were formed, which helped inform subsequent stages of policy-making. The following sections profile CNHDRC's evaluations of the reform of China's rehabilitative care delivery system.

(1) Study of pilot work on integrated rehabilitative care delivery in 7 pilot cities

Background

In 2009, the Chinese government launched radical national health system reforms aimed at establishing an integrated healthcare system providing preventive, curative and rehabilitative care. Rehabilitative care has been underdeveloped in the Chinese healthcare system for decades, with shortages of human resources and fragmented care delivery. During 2011–2013, the Ministry of Health launched experimental pilots in 46 cities aimed at improving the delivery of medical rehabilitation. It issued a guiding plan, delineating the basic principles and identifying the main elements of the reform, but it left detailed design to local governments (Ministry of Health 2012). The MoH commissioned the CNHDRC to conduct an evaluation to inform policy formulation and it sent a supplementary policy document to all pilot sites on evaluation requirements, with a detailed plan for monitoring and evaluation. In consultation with decision-makers, the CNHDRC team produced guidelines for monitoring and evaluation (M&E) before the launch of the pilots. The M&E aimed to measure progress, identify problems, facilitate adjustment of the rehabilitative care system, and extract workable models,

approaches and mechanisms to inform subsequent policy development and scale-up. The M&E was conducted in 2 stages. During the first stage (2011–2012), the evaluators collected quantitative and qualitative data to review progress in each locality and visited key sites to identify issues and summarize lessons and experiences. During the second stage (2013), seven pilot cities were selected for more detailed study, including a cost-effectiveness analysis that compared pilot and control hospitals. Only two of the seven pilots showed the anticipated impact. Since the pilot program represented 3 years' of effort by local governments and pilot hospitals in 46 cities, the central decision-makers did not want to draw hasty conclusions based on these results. They wanted to know why some pilots could demonstrate impact while most others could not. Following discussion with the decision-makers, the CNHDRC researchers shifted their focus to studying the mechanisms leading to certain outcomes in each locality, in an attempt to explain the cause of failures or successes.

The researchers drew on the approach of realist evaluation to design this study. They made use of a 'context-mechanism-outcome' (CMO) framework to develop case studies showing what works for whom in what context (Pawson 2013). By reinterpreting the data and findings, they uncovered interesting stories about how some localities achieved the goal of the reform.

Mechanisms chosen by different local reformers in specific contexts were studied and common patterns of local choices were identified to form a middle-range theory (Figure 2 - 6) for understanding the mixed results of the impact analysis.

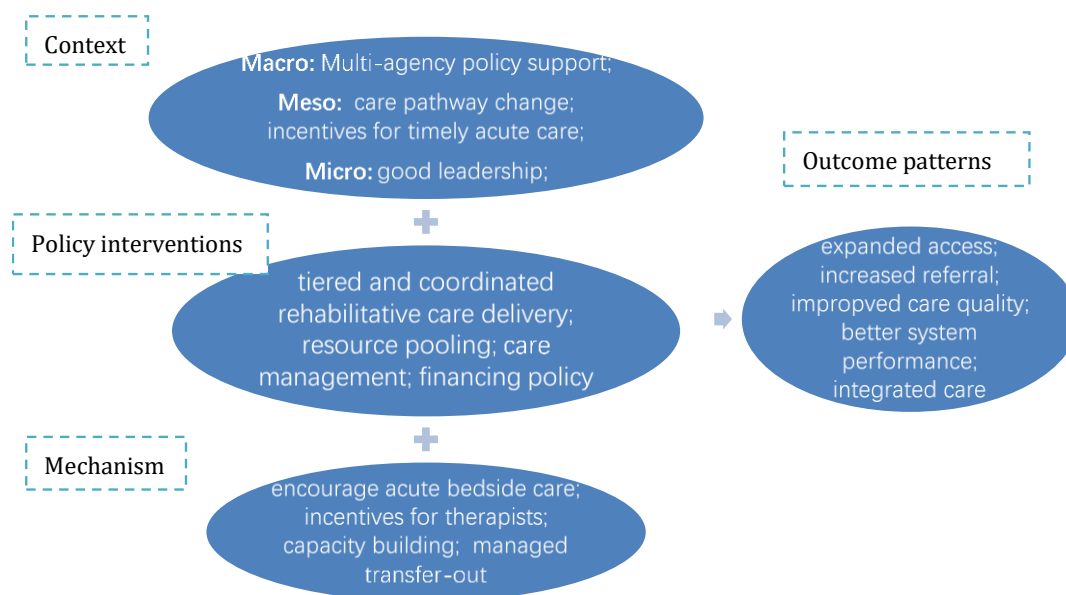


Figure 2 - 6 The middle-range theory of the national pilot programme

Different approaches to local reforms

The approach to piloting was experimental to allow local authorities space to develop innovative practices that could inform national policy. City governments showed three types of behaviour: passive incorporation of national policy requirements into local implementation plans; reflection of national policy in local implementation plans, but with tweaks to reflect the local context; and development of innovative local reforms to re-interpret or expand national policy in an attempt to meet local needs in a contextually-specific way. The evaluators were most interested in cities that took the third approach, since they were most likely to generate innovations or breakthroughs that could advance national policy making.

The approaches taken varied, due to the choices and strategies of local stakeholders (including policy-makers, program managers, and service

providers) and the reactive behaviours of key stakeholders in the pilot cities (including health managers and medical staff in local health facilities). The reforms stimulated a range of reactions by key stakeholders, most notably the health care institutions. Some were passive, while others viewed the reform as a chance to secure more resources and policy support. Hospital presidents and department heads were key decision-makers, and put in place many measures to promote care synergy, expand access, and encourage utilization of care. Hospital managers commonly used economic incentives to encourage provider behaviour change. Some active reformers stood out from the rest, and contributed to further development of the reform.

Politicians and health policy-makers in localities with successful pilots tended to play a critical role by coordinating and streamlining policies concerning care planning, service delivery, pricing and payment of rehabilitative services. Without political and institutional backup, facility-level success could hardly have been replicated. Pioneering policy-makers expanded the reach of the policy by exploring synergy between different policies concerning rehabilitative care. This provided a favourable context for nurturing reforms. For example, Shanghai Municipality coordinated relevant agencies, such as the Bureau of Human Resources and Social Security, and the Municipal Disabled People's Federation. A joint policy on transforming some secondary public hospitals into rehabilitative care facilities was issued, and three hospitals were transformed into specialty care facilities by the time of the CNHDRC investigation, greatly increasing overall rehabilitation capacity.

Resource pooling was also a common policy measure. Kunming, Shandong and Beijing pooled resources from the Disabled People's Federation to support delivery of medical rehabilitation. Kunming Municipality encouraged pilot hospitals and rehabilitative practices owned by the Disabled People's Federation to share practices and funding and to deliver care for both acute

and long-term patients. The Bureau of Human Resources and Social Security manages funds for occupational rehabilitation care for enrollees of occupational injury insurance schemes, and usually designates hospitals or wards for its patients. However, no particular mechanism was introduced to change the benefit package of the publicly funded health insurance schemes, and huge disparities of coverage and benefits for the patients covered by occupational insurance and others remained in all pilot sites.

Against the background of ongoing public hospital reform, the pilot hospitals mostly adopted clinical pathway management, and tried to adjust care pathways by including rehabilitative care. Common institutional approaches to care integration included incentives for timely and active acute rehabilitative care, and managed discharge of patients. Huashan Hospital in Shanghai sent therapists to work in neurology and orthopaedics wards to promote bedside physical therapy, which shortened the average length of stay (ALOS) in these wards. Hospitals in Kunming, Harbin and Zibo closely managed discharge of patients, to ensure continuous care.

Some innovations, aimed at addressing particular challenges, stood out. In order to improve utilization of rehabilitative care, township health centres in Zibo city used acupuncture and TCM medicines as part of rehabilitative care pathway for stroke patients. In Liushui Township Health Centre of Zibo, informed consent was obtained from patients who refused to undertake rehabilitative care to ensure they were aware of the risks of giving up important rehabilitative care. Such innovative measures were usually taken under the leadership of strong policy-makers or care managers.

Another mixed example is Zibo City in Shandong Province. The cost-effectiveness analysis did not show any meaningful results; however, some interesting findings pointed to possible future success. The city had a

strong focus on traditional Chinese medicine (TCM), and applied acupuncture and other TCM approaches popular among local residents in treating patients with cerebral infarction and haemorrhage. This helped to promote rehabilitative care in township health centres and encourage uptake by local patients. Zibo Health Bureau stressed education and advocacy. They compiled rehabilitative training materials, which were distributed to all health facilities, and required all doctors to learn these basics and raise their awareness of the importance of early and timely provision of clinical rehabilitation.

Factors contributing to different outcomes

The researchers undertook a preliminary mapping of contexts, mechanisms and outcomes (World Bank Group, World Health Organization, Ministry of Finance, National Health and Family Planning Commission, Ministry of Human Resources and Social Security, The People’s Republic of China 2016). to describe reforms underway in each pilot city. Table 2 - 2 summarises the findings on several successful and unsuccessful pilots. This allowed the evaluators to summarise common mechanisms and emergent practices, to probe (Chapman 2004) the operation of national policy in the actual institutional contexts encountered in the pilot cities, and then provide feedback on the operation of policy in the field to national policy makers.

Table 2 - 2 Outstanding CMOs in the 7 pilot cities

Pilot Cities	Hypotheses (contexts + mechanisms + Outcome patterns)
1 Beijing	<ul style="list-style-type: none"> - C: previous trials on rehabilitation care delivery; strong political and professional commitment; great health financing capacity; innovative provider payment methods; public tertiary hospitals packed with patients; limited acute rehabilitative competence in tertiary hospitals. - M: Supporting competent private hospitals in providing bedside acute rehabilitation in public tertiary hospitals, and building service network with community health centers for providing long-term rehabilitation; optimal allocating and use of rehabilitative resources;

		-O: improved efficiency, accessibility, affordability and effectiveness of rehabilitation
2	Shanghai	<p>-C: political commitment; good cooperation between government agencies, such as health, social security, civil affairs and disabled people’s federation; innovative provider payment methods; public tertiary hospitals packed with patients; no rehabilitation beds in public tertiary hospitals;</p> <p>- M: Transforming poorly-performed public secondary hospitals into rehabilitation hospitals; competent tertiary hospitals taking lead in building service network; encouraging training and staff exchanging to build up post-acute rehabilitation capacity in secondary and primary care; optimal use of rehabilitative resources;</p> <p>- O: improved efficiency, accessibility, affordability and effectiveness of rehabilitation;</p>
3	Harbin	<p>- C: Good collaboration between the municipal health authority and disabled people’s federation; great attention to regional rehabilitative capacity planning; the teaching hospital of the Harbin Medical University delivering acute rehabilitation, providing training and staff exchanging with other rehabilitative care providers in the district;</p> <p>- M: Optimizing allocation of rehabilitation resources; contract-based cooperation of rehabilitation care providers; encouraging training and staff exchanging to build up post-acute rehabilitation capacity in secondary and primary care; optimal allocating of rehabilitative resources; financial incentives;</p> <p>-O: improved efficiency, accessibility and effectiveness of rehabilitative care</p>
4	Zibo	<p>-C: Strong political commitment; good cooperation between government agencies, strong development of traditional Chinese medicine; payment-based referral incentives; -M: clinical protocol and guidance development; training and licensing of rehabilitation professionals; public advocacy on usefulness of rehabilitative care; encouraging training and staff exchanging to build up post-acute rehabilitation capacity in secondary and primary care; financial incentives;</p> <p>-O: improved accessibility and effectiveness of rehabilitation</p>
5	Changsha	<p>-C: Multiple teaching hospitals located in the city (strong medical and rehabilitative capacity); healthcare as a top issue on the political agenda, active private sector;</p> <p>-M: establishment of a private tertiary rehabilitation center; encouraging public-private-partnership between the private rehabilitation center and public teaching hospital; contract-based cooperation of rehabilitation care providers;</p> <p>-O: improved accessibility of rehabilitation</p>
6	Kunming	<p>-C: Pre-existed collaboration between the Provincial Disabled People’s Federation, the Medical Rehabilitation Association and the pilot tertiary hospital; strong leadership of the rehabilitative department of the pilot tertiary hospital; favorable internal management and incentives for rehabilitative care provision in pilot hospitals;</p> <p>-M: developing a separate long-term rehabilitation center with resources, funds and other material resources from the Disabled People’s Federation and technical support from the pilot hospital; encouraging acute rehabilitation in the tertiary hospital; the pilot hospitals signing contract with other rehabilitative care</p>

7	Urumqi	<p>providers in the district to improve referral and care integration; promoting public-private partnership;</p> <p>-O: Improved efficiency, accessibility and effectiveness of rehabilitation</p> <p>-C: Strong political, managerial and professional commitment; great leadership of rehabilitative care in pilot hospitals; a internal culture for encouraging innovation and improving care delivery in the pilot provincial hospital;</p> <p>-M: the pilot public tertiary hospitals building rehabilitative care alliances with other care providers in the district; providing bedside acute rehabilitative care;</p> <p>-O: improved efficiency and accessibility of rehabilitation</p>
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Many novel local practices were assessed during field visits by the research team, and comments and recommendations were fed back to local decision-makers. Field visits carried out by the research team usually included central health policy-makers, health policy or management experts, and clinical experts, providing a solid basis for conducting rapid assessments. Focus group discussions with local stakeholders were used as an informal platform for discussing problems and potential solutions, and opened up a space for information sharing and learning. In many cases, this helped build consensus among different actors, promoted a common assessment of new practices, and dissemination of local innovations. In some cases, new and innovative practices received positive feedback and were fed into further decision-making. For instance, after the first phase of piloting, Shanghai issued a policy to turn several secondary public hospitals into rehabilitative hospitals to strengthen rehabilitative care capacity, and this novel reform has continued to be built on in the care integration reform in Shanghai, following which some underperforming public secondary hospitals have been transformed into rehabilitative hospitals to strengthen their rehabilitative and long-term care capacity. Based on a comparison of the strategies and measures adopted by key agents in different localities under the middle-range theory of the pilot, the researchers formed policy recommendations for further development of the national pilot program. Political commitment, cross-governmental cooperation, acute rehabilitation competency in tertiary

hospitals, and professional leadership were identified as key contextual factors for successful implementation. Defining roles and responsibilities of different care givers, effective resource pooling and allocation, incentives for care coordination and integration were common effective policy interventions used by the pilots and the potential for scaling up was discussed. The report stimulated further discussions between the MoH and other ministries regarding rehabilitative care, and the end of 2016 saw issuance of a joint policy by the MoH and Ministry of Human Resource and Social Security, under which more rehabilitative care was included in the national benefit package to provide financial incentives for care coordination and integration, and some core recommendations of the report were referenced.

(2) Evaluation of the merger of maternal and child health and family planning services

Background

In early 2013 the Ministry of Health and the Population and Family Planning Commission were merged to create the National Health and Family Planning Commission (NHFPC). The policy on merging the two ministries was issued at the end of 2013 and by the end of 2014, 31 provinces/municipalities had completed this administrative reform at provincial level, and 17 provinces had initiated the merger of maternal and child health (MCH) and family planning facilities at city, county, and township levels. The CNHDRC was first commissioned by the Department of Health Planning and Information of the MoH, with support from UNICEF, to evaluate the merger of MCH and family planning facilities in three western provinces prior to the formal administrative

reform in 2013. They produced a two-page briefing for the MoH, which identified a number of potential problems, such as the possible mishandling of public property and the weakening of MCH or family planning service delivery capacity at county, township and village levels. Two ministers made comments on the briefing and requested that the Department of Maternal and Child Health organize follow-up studies on the reform.

The CNHDRC was asked to conduct a rapid assessment of progress in implementing the merger. Central policy-makers expected to see the emergence of a range of innovative practices. The merger policy evaluation had a strong utilization focus. The policy-makers wanted to follow the initial reaction and immediate results of local reforms through a more objective lens they called evaluation.

Study design

The merger was an entirely new initiative, and central policy provided only a general framework for local implementation. Local governments were expected to design operational plans incorporating implementation requirements, and most provincial governments conducted their own pilots before developing provincial implementation plans. There was a widespread need for learning, and the evaluation was designed as a channel for learning and sharing information. A case study design was chosen to generate knowledge about the local reform processes (Yin 1997) and four rural counties from different regions were selected as typical cases. Administrative and institutional data were collected and focus group discussions with representatives of provincial, municipal and county health and family planning authorities were scheduled, as were semi-structured interviews with managers and staff working in county-level MCH and family planning facilities. The field visits were structured to enable the evaluators to collect information on

emergent policy innovations, identify problems and deviations from central policy, and help local stakeholders reach consensus on key issues involved in the merger. Other relevant government agencies were also invited to participate in the provincial and county meetings, to collect their views of, and attitudes towards, the reform. The deputy county mayor in charge of health and family planning issues in each county was invited to preside at the county-level meeting.

The NHFPC arranged for four policy experts to participate in the field visits. These experts were local decision-makers with a lot of experience of working on health and family planning issues. One had participated in the design of the current reform. The aim of involving these policy insiders was to sensitize the evaluation to local contexts, filter information and innovations, and make findings more useful for their primary intended users — central decision-makers.

Given the early stage of the reform, many policymakers at county, city and provincial levels hoped to learn from the rapid assessment by the independent evaluators. The team visiting the counties was usually joined by one or two provincial or municipal officials, who hoped to gain a deeper understanding of changes taking place at the local level and to get feedback on these changes from national experts. Deputy county mayors often attended focus group discussions of county policy-makers to present their views and concerns, and ask for more financial and policy support from provincial and national governments. The involvement of these secondary users of the evaluation findings pushed the field visits to become more utilization-driven, with a clear focus on learning.

Local adaptation and feedback to policy-making process

The analysis of routine institutional data revealed little about the initial results of implementation. However, interviews and focus group discussions were information-rich and insightful. The four counties showed varying degrees of progress with the reform. A range of non-linear, self-organizing and emergent behaviors of local agents were found.

Policy makers in the different localities carried out the reform in different ways. In places that had completed the administrative merger between the health bureau and the family planning commission, health policy makers tended to focus on the merger of MCH and family planning facilities, and were active in implementing the reform. In localities where the administrative merger had not been completed, health bureaus were mostly inactive in implementing facility-level reform. County governments and government agencies reacted differently to the reform, and some county governments twisted the policy to meet their own ends. For example, one county government used the reform as an opportunity to build a women and children's hospital. This created resistance amongst staff of the county MCH Centre, whose benefits would be adversely affected if they were required to transfer to the new hospital. These staff, with encouragement from the county health bureau, complained openly and sent a signed petition to the CNHDRC researchers. After consultation with the policy experts and central health decision-makers, the researchers treated this case as a mishandling of institutional merger and reported the unintended consequences and flagged these illegitimate practices.

The report to the NHFPC noted that actors engaged in the reforms interpreted central policy differently and had varying responses to it. The evaluators found that the trajectories of the same reform in different localities were non-linear, and that they showed self-organizing and emergent behaviours by multiple

agents as well as feedback loops. The ways that individual agents or institutions reacted to the reform could change its course in a given locality. Earlier reforms and local contexts were not uniform in the pilot counties, and had a large impact on how the reforms progressed, and the outcomes of the reform, in each locality. Through their role in assessing progress, the team helped to facilitate communication between policy-makers at various levels by explaining subtleties of policy to local officials and rapidly reporting local innovative approaches. In their field trips, the meetings with key reform stakeholders (such as decision-makers, policy implementers, service suppliers, etc.) at local and provincial levels played unique roles in facilitating this kind of communication. Novel and emerging practices were usually rapidly screened by the evaluators and reported either formally in their field trip reports or informally through meetings with central policy-makers. In the second case, the central government dispatched a number of individuals close to the policy process to join the evaluators, to help them rapidly arbitrate over illegitimate practices and legitimate policy innovations. In the first case, the evaluators were engaged in designing and delivering the policy experiment, to get a deep and accurate understanding of the trial and expected outcomes.

In some cases, the evaluation team was able to deliver key policy messages to localities on behalf of central decision-makers, and thereby encourage a number of good and innovative practices, and discourage illegitimate and negative practices. In some cases, the policy experts on the team were able to propose potential solutions to some problems encountered in the localities, while the presence of the evaluation team also allowed messages from the localities to be transmitted to provincial and central policy-makers. This two-way information flow contributed to mutual learning between policy implementers and designers, and helped health reformers in central and provincial government to navigate the complexity of this reform.

(3) The role of evaluation in screening for innovative practices and guiding reform

In the two cases, central government used open or semi-open policy frameworks to provide space for sub-national governments, and implementers designed and implemented local plans which both conformed to the principles for reform set by central authorities and spoke to complex local conditions. This ‘one size does not fit all’ (Wang 2009) approach creates dynamic processes. Chinese reforms are frequently hurried, and pilot localities are given limited time to effect change. In such a situation, evaluation of policy implementation usually has a strong utilization focus. A research team trusted by the government, such as CNHDRC researchers, can form a working relationship with the intended users. This kind of early-stage evaluation of new reforms in a complex system can provide a ‘probe’ for local practices, increasing understanding of system dynamics as revealed by the reform process, and evaluators can screen for emergent innovations, both “good” and “bad”. It is important to pick up deleterious outcomes early to avoid big deviations from the intended direction of development. Narratives that can clearly tell local reform stories, and make links between context, emergent mechanisms, and (where possible) outcomes, are persuasive tools in guiding reforms. The final output of the second commission was a two-page report on key findings and policy recommendations.

The participation of ‘policy experts’ in the evaluation meant that the evaluation team also disseminated information on the core principles of policy and provided guidance to local level implementation. This, in turn, generated feedback from local implementers, which could be fed back to central decision-makers. In some cases, this informed subsequent rounds of policy making or led central authorities to introduce additional regulations. In this way,

the evaluation process created a platform for learning and exchange of information between different agents or parts of the policy system. This approach served as a support to local and central reformers charged with managing change under conditions of great complexity, and helped reduce the risk of making major policy mistakes.

While such an approach helps support the management of change at scale in a rapidly changing environment, and is relatively quick and easy to conduct, it has several prerequisites. Firstly, the pilot program or policy is undergoing evolution and development, which means that there is no predefined model or best practice to copy, therefore, the purpose of initial evaluation is to rapidly screen for emerging successful practices or promising innovations, to support continuous learning and improvement of the local trials, and to feed back to program and policy development.

Secondly, evaluators must be trusted by policy-makers. As shown in the two cases, the presence of policy experts in the evaluation team increased the team's credibility and helped facilitate dialogue between decision-makers at various levels. In the Chinese case, distinct and institutionally-specific cultures of credibility/legitimacy help underpin effective evaluation and learning. These are not solely related to technical competence in evaluation methods, but also to situatedness and contextual understanding, which we have argued to be of importance in understanding change in complex systems (Wang 2009). To an extent, the role of evaluators is not confined to that of impartial and disinterested scientists. Rather, they are actively involved in steering local reform efforts.

A third prerequisite is adequate representation of different stakeholders and systemic interests in the evaluation process. In the case of the reforms discussed here, it was important that focus group discussions with local

policy-makers be arranged so as to include the main policy making agencies, including local government, health bureaus as and other government agencies with a stake in the reform, as well as other institutions affected by the reform, including health managers, medical staff and so on. Only in this way could the range of interests affected by, and impinging on, the reform be represented, and key responses to the policy be understood and reflected to the designers of the reforms.

2.2.4 Conclusions

The paper has argued for the importance of a utilisation-focused approach to evaluation in China's management of experimental reform processes. The policy system in China is characterised by high levels of discretion on the part of implementing units (sub-national governments, local health bureaus, hospitals, and the like) which are on the front line of management of many health reforms. As demonstrated by the two cases, close evaluator-user interaction plays an important role in quickly screening effective local practices, engaging various stakeholders, and enabling iterative systemic learning. We argue that this is one part of 'managing for emergence' in complex systems, and has the potential for exploring ways to ensuring external validity. The case studies show changing demand from national policy makers, and how the Chinese research institutes and researchers are experimenting with new approaches in the evaluation of complex reforms, while building on indigenous assessment repertoires made use of by the Chinese state.

Many evaluation approaches focus on making claims about the internal validity of a given intervention, asking how sure we can be that a given action or input led to a given result. However, for managing rapid change in a complex context, Chinese decision-makers seem to be more interested in engaging researchers/evaluators at an early stage of implementation to feed

into the policymaking cycle as demonstrated in case 2, or understand common patterns of local reforms and narratives behind success or failures as in case 1. We have argued that such a utilization-focused approach can expand the scope for learning through evaluation in complex systems, where the aim is to foster desirable emergent states. Assessing novel policies and practices and their potential systemic usefulness requires making claims for external validity – where contextual factors differ in many (and often unknowable) ways, how can we make claims regarding the replicability or systemic usefulness of novel practices we observe? How should we arbitrate over the distinction between innovations that deserve to be encouraged or promoted, and unhelpful or illegitimate practices that should be discouraged?

While by no means all reforms receive this degree of attention from policy-makers and evaluators, and while approaches discussed in this paper are a work in progress and need more careful study, this paper has shown how Chinese decision makers' cultures of decision-making have led to the use of evaluation as a way to support the management of reforms in rapidly changing and complex contexts. The paper has shown how Chinese researchers are experimenting with new approaches to policy studies, attempting to better link contexts and outcomes, and how rich reform narratives, including assessments of innovative mechanisms and explanations of failures, are becoming important parts of the Chinese repertoire in attempting to systematise learning from pilot reforms. Such approaches are gaining ground in health policy research and evaluation, though more careful studies are needed to examine their linkages with existing evaluation approaches such as realist evaluation or utilization-focused evaluation.

The cases discussed here show evaluations that were designed at the outset of national pilot programmes and indicate a degree of institutionalisation of evaluation and learning in the reform/piloting process. Strong government

backing helped increase the legitimacy of the evaluation process and build trust. By including 'policy experts' in the evaluation process, the central health and family planning authority created a trusted probe to help channel information they needed, creating feedback loops and new flows of information, and helping build systemic reflexivity. A willingness on the part of government to accept and use evaluation findings reflects a culture of decision making that, at least in part, accepts imperfect outcomes and attempts to learn from limited inferences to make rapid decisions.

As China's reforms continue, and as the demands of government change, we can expect to see increasing investment in the evaluation of complex reforms. This will require increases in the capacity of a broad range of institutions to provide support to government, in health and in other domains of social (and other) policy. This is creating new institutional linkages and networks of research institutes, and is likely to create space for methodological innovation. Globally, the importance of managing reforms under conditions of complexity is becoming better understood, including in global health. Practices such as those described in this paper are attempts to deal with this. New approaches with a strong utilization focus and realist perspective may have potential for bridging knowledge gaps in managing rapid changes in complexity.

Chapter 3: How does the meta-learning take place in China

The previous chapter describes the nature of policy meta-learning in the context of UHC, and analyses the role of evaluation and research as well as the need of meta-learning in effectively supporting single- and double-loop learning. This chapter discusses how does the meta-learning happens and what outcome can be achieved in rapidly changing and complex situations. It seeks answers for the following specific questions:

- 1) What are the learning mechanisms?
- 2) What is learnt?
- 3) What learning outcome is achieved?
- 4) To what extent the learning has supported single- or double-loop learning?

The first case described a case study of developmental evaluation of essential drug policy in three rural Chinese counties, and studies the multiple layers and varied outcomes of policy implementation by employing a complexity lens. It took a snapshot of the in-depth complexity and uncertainty of the healthcare reforms, and delivers a strong call for initiating new learning ability both of the researchers and of the policy-makers and implementers. It revealed not only the need of ability of decision-makers in examining the program theory of the complex health reform (double-loop learning), but also the need of improving research capability of the researchers (deutero-learning) in supporting such learning.

The second case is about the researchers' experiment of a new evaluation approach—utilisation-focused evaluation in supporting the building of the basic change theory of the Chinese health system reforms and development

between 2011 and 2016. The researchers have built a conceptual indicator framework for evaluating key health development and reforms during the 12th Five Year Plan period (2011-2016) through organising a deliberative process for various actors. Against the background of radical health system reforms, such an active approach to organised or collective learning showed the initial attempt in building meta-learning ability of the policy actors such as researchers and health planners. This participatory learning approach was jointly developed by the actors engaged in the process with the facilitation of the CNHDRC researchers.

The third case is latest trial on developing mechanism for making disinvestment decision on the essential public health service. The CNHDRC researchers tried to offer support for the key decision-makers in designing, organising, and managing the disinvestment process. A deliberative process was organised by employing the multiple criteria decision analysis (MCDA), and comprehensive evidence review done with new tools like the health technology assessment (HTA) and the conventional tools like field surveys and visits to local sites. Key policy actors were identified and explicitly engaged in designing the research and decision-making process. This methodology trial itself was complex large-scaled experiment, engaging multiple actors at different level. The case study documented the steps taken by the researchers and the other policy actors, and discussed the success and failure of the proactive approach to whole-community learning. Instead of a presentation of tools and methods employed by the researchers, the case gave an in-depth account of how to design, implement, and manage the learning of methodology itself.

The main learning mechanisms, as proposed in the three cases, are new research and evaluation approaches, such as the developmental evaluation in the case of essential medicine policy, and HTA and MCDA in the public health

disinvestment case. Learning contents included the local context, altitudes, reactions, key coping strategies (mechanisms) taken by key actors, outcome and impact, as well as some unexpected consequences. Research-based activities offered learning opportunities for multiple actors, and the think-tank, CNHDRC was consciously aware of its role in managing and facilitating the learning process. The existence of CNHDRC, its designated role in learning local innovations, and its active participation in expanding learning by inventing new tools for learning are all part of the meta-learning construct deployed by the Chinese government.

Various forms of learning outcomes have been achieved in the 3 cases. With meta learning of single- and double-loop learning all happening at the same time, the central government and local implementation units, as the key policy learner in the process could not only quickly learn about the progress, outcome, consequences or impact of the policy or reform, but also have a chance to review and address the governing variables of the pilot program or policy implementation. The think-tank, as part of the meta-learning construct built by the Chinese government, has enhanced their ability of engaging with multiple actors by conducting research activities and employing new tools. The innovative methodology taken by the CNHDRC can be called one particular meta-learning outcome.

The policy meta-learning designed and executed with the support of the CNHDRC has contributed to single- and double-loop learning. The quantitative and qualitative data collected for measuring progress and output were the result of the single-loop learning, while the local actors' adaptive behaviours and feedbacks to the reform policy were documented by the researchers. More importantly, the CNHDRC created a knowledge generator through arranging the study tour or designing the research in the particular way with the backup of the national decision-maker. Although it was not

always a success story as showed in the disinvestment of the public health service, the thinktank did its best in developing tools needed for explicit priority-setting decision. Such comprehensive decision-supporting tools developed by the CNHDRC were main policy meta-learning mechanisms driving single- and double-loop learning forward.

3.1 Essential drugs policy in three rural counties in China: What does a complexity lens add?

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Abstract

In 2009 the government of China identified an essential drugs policy as one of five priority areas for health system reform. Since then, a national essential drugs policy has been defined, along with plans to implement it. As a large-scale social intervention, the policy will have a significant impact on various local health actors. This paper uses the lens of complex adaptive systems to examine how the policy has been implemented in three rural Chinese counties. Using material gathered from interviews with key actors in county health bureaus and township health centers, we illustrate how a single policy can lead to multiple unanticipated outcomes. The complexity lens applied to the material gathered in interviews helps to identify relevant actors, their different relationships and policy responses and a new framework to better understand heterogeneous pathways and outcomes. Decision-makers and policy implementers are advised to embrace the complex and dynamic

realities of policy implementation. This involves developing mechanisms to monitor different behaviors of key actors as well as the intended outcomes and unintended consequences of the policy.

Key Words: Chinese health system reform; essential drugs policy; complex adaptive systems; unintended consequences; policy implementation

3.1.1 Introduction

In April 2009, the State Council of China released the guidance and plan for a new round of health reform (Xinhua 2009). This was the launch of the most radical and comprehensive health reform in Chinese history. Chinese policy-makers regard the essential drugs policy as a leverage point for changing the whole health system. They hope that it will make essential drugs available, control drug costs and reduce the irrational overuse of drugs, such as steroids and antibiotics.

In 2009, a plan was issued defining key actors, their responsibilities, and targets for implementation of the essential drugs policy reform (Ministry of Health and Other Eight Ministries 2009). It outlines that: 1) the National Joint Committee on Essential Drugs (composed of representatives from the nine ministries and coordinated by the Ministry of Health) will compile the essential drug list and issue policies regarding drug pricing, quality assurance, and compensation of health providers; 2) provincial governments will be in charge of centralized drug tendering, procurement and pricing; and 3) all basic public health facilities at or below county level should purchase and use essential drugs and implement a policy of zero markup of retail drug prices above cost.

According to the Health Minister Chen Zhu, the policy framework of the national essential drugs system is like a piece of “complex system

engineering”, which is composed of seven interconnected parts (CCTV 2009): 1) essential drug list selection and management of future adjustment; 2) production and supply of essential drugs; 3) pricing and sale with “zero markup”; 4) rational delivery and use; 5) proper compensation mechanism; 6) safety and quality assurance; and 7) performance evaluation of the operation of the system itself. Under each system part, a set of procedures need to be formed to guide proper implementation. The seven parts combine together to form the institutional framework for the essential drugs system in the country.

The World Health Organization (WHO 2011) defines essential drugs as drugs that can meet the basic needs of the people. The selection of essential drugs must be based on public health relevance, evidence on efficacy and safety, and comparative cost-effectiveness. Essential drugs should be available and affordable to communities and their quality and safety must be assured. The Chinese health system has many actors at different levels, such as health providers, hospital managers, county and provincial officials, manufacturers, insurance agents, regulators, and patients. These actors may respond to the essential drugs policy by changing their behaviors in ways that produce positive or negative effects. The new policy adds complexity to the health care system by changing the rules and relationships between these actors, and emphasizing certain outcomes such as cost containment and proper drug use.

After initial implementation of the essential drugs policy, experiences and problems from local implementation need to be collected. A team of evaluators from the China National Health Development Research Center (CNHDRC) was commissioned by the Ministry of Health to do an initial evaluation of the implementation of the essential drugs policy. This paper documents their attempts to interpret findings from a study they conducted in three rural counties in the Western region of China.

The authors explored recurrent themes or problems in the different contexts of the three counties, to find out coping mechanisms of main actors and their potential impact on the policy implementation and come up with rapid feedback to policy makers and implementers. They found that conventional program evaluation designs were not applicable to the diverse and complex contexts. They applied complexity theory to better understand initial implementation of the policy in the Western rural settings, in the hope of framing the issues faced in policy design and implementation and preparing a model for evaluating policy implementation.

3.1.2 Conceptualizing implementation of the essential drugs policy as a complex adaptive system

(1) Complex adaptive systems and its use in healthcare system analysis

Complexity science, or study of complex adaptive systems, originated from running agent-based models on computers which attempted to model complex natural or artificial behaviors, or more recently complex social phenomena such as health interventions and reforms (Rous 2008; Paina & Peters 2011). In recent years, analysts have used complex adaptive systems to better understand health systems and their reforms (Plsek & Greenhalgh 2001; McDaniel and Driebe 2001; Plsek 2003; Beverly et al. 2004; Rous 2008; Atun & Menabde 2008; Savigny & Adam 2009; Paina & Peters 2011). Many regard it as a helpful modeling framework to conceptualize complex health systems issues (Plsek & Greenhalgh 2001; McDaniel and Driebe 2001; Gatrell 2005; Lessard 2007; Haggis 2008, 2010).

Complex adaptive systems consist of numerous interacting parts capable of self-organizing activities, adapting to outside environments and learning from experiences (McDaniel and Driebe 2001; Plsek & Greenhalgh 2001; Plsek 2003; Rous 2008; Paina & Peters 2011). In a health system, the interacting parts or agents can be comprised of individuals such as clinicians and patients or collectives of individuals such as clinics and hospitals, with agents fulfilling particular roles in the system, comprising processes such as the provision of medical services.

Complex adaptive systems are also nested and open, meaning that there are systems within systems, and that agents can exchange information and interact freely (Anderson & McDaniel 2000; Gatrell 2005). The self-revising movement of information, or feedback, may help the systems to change or stabilize (McDaniel and Driebe 2001). A system may experience positive feedback loops that accentuate a change, or negative feedback loops that moderate a change (Gatrell 2005). Co-evolution is also observed as systems not only change themselves but the world around them (Beverly et al. 2004).

With rich connections and interactions, agents are dynamic and produce nonlinear responses that often have system-wide impact (Plsek & Greenhalgh 2001; Gatrell 2005; Rous 2008; Paina & Peters 2011). One agent's behavior may change environments of other agents, because boundaries between agents within or between systems are open and fuzzy (Plsek & Greenhalgh 2001; Gatrell 2005). Yet behaviors of apparently independent agents in social systems are based on internalized psychological and social rules, or by external policies and regulations (Rous 2008). Because agents' needs or desires reflected are not homogeneous, their behaviors may conflict with each other or with policy and system objectives.

Agents learn and adapt in response to behaviors of other agents or changes

in rules, often in ways that produce self-organization (Plsek & Greenhalgh 2001; Gatrell 2005; Rous 2008). Self-organizing activities of agents enable the systems to change structures and adapt to changes in internal and external environments (Anderson & McDaniel 2000; Gatrell 2005). These behavior patterns emerge rather than being designed into the system. The nature of such emergent behaviors may range from valuable innovations to unfortunate accidents. Due to emergence, the whole system may be greater than the sum of the system parts (Lessard 2007). As a result, one cannot predict system response by “summing” or “averaging” components (Gatrell 2005). Outcomes of complex adaptive systems are shaped by adaptations and interactions of agents and components, rather than by central control or predetermined design (Anderson & McDaniel 2000; Gatrell 2005). Therefore, it is impossible to make exact predictions of system behavior.

Understanding complex adaptive systems provides us with a different perspective for analyzing complex healthcare organizations and systems in terms of the policy development, health management and evaluation (Beverly et al. 2004). Economic evaluation approaches have long dominated health policy evaluation (Lessard 2007). Recently some authors suggest that complexity theory may help to conceptualize evaluation in healthcare, for notions such as self-organizing, emergence and non-linearity may make up for what are missing from the current economic evaluation approaches (Gatrell 2005; Lessard 2007).

Some authors move one step further to use complexity theory in the evaluation of complex policy initiatives. In the past evaluation has mostly depended on linear logic models to examine a project’s theory of change, while the recent decade has seen an emerging trend that use the complexity lens in evaluation (Barnes et al. 2003, Patton 2011; Williams and Iman 2007). The new trend, named the developmental evaluation approach, shows some distinguished features. First, by looking at the system as a whole and

exploring the interconnections or dividing lines (boundaries), the evaluator can have a more realistic view of the world in which his or her evaluation will take place. Second, a real-world policy or program is viewed as a complex adaptive system, with many systems entangled together and influencing each other. Third, the developmental evaluation method is more helpful in the context of social innovation where there exist no fixed models.

Local implementation of the essential drugs policy is a large-scale social intervention. We believe that a complexity lens can help to recognize uncertainty and the changing nature of policy implementation and discover recurrent issues or themes for further evaluation, which will be the key contribution of our study to health policy evaluation in China.

(2) Implementation of the essential drugs policy as a complex adaptive system

In over three decades of health reforms in China, it has been observed that most reform is implemented incrementally (Liu & Bloom 2010). Chinese policy makers appear to believe that reform cannot be achieved overnight. They anticipate a long and complex process requiring an incremental approach to try out new ideas and methods. Making positive changes and adapting to favorable changes occur together in this reform approach (Luo 2011). This enables the government to reduce the risk of making big mistakes, and gives various stakeholders time to adapt to changes brought about by the reform (Liu & Bloom 2010).

Given China's large size and big disparities between provinces, prefectures and counties, it is hard for the central government to require different localities to implement a health policy in a uniform way. After the decentralization reforms of the 1990s, local authorities acquired more power over economic

and social development decisions, which increased the diversity across various localities. As observed by some health policy researchers, a general pattern of health policy implementation has emerged in the country, namely the “experiment, experience and expansion” approach (Liu & Bloom 2010). Following broad policy statement and reform strategies, local provinces are supposed to develop their own implementation plans and experiment on respective models within their local context. As documented by Bloom and his colleagues (2010), policy implementation in China is viewed as “an iterative process in which local experiences are rapidly fed back to policy-makers to revise designs continuously”. Experiences and lessons are collected from time to time to enable rapid learning of key stakeholders and fed back to decision-making process. Finally good models are identified for promotion and scaling up.

The essential drugs policy, as part of a massive health system reform program, is meant to be implemented in this way. According to the national implementation strategy, no less than 30% of counties (cities and prefectures) in the country had to implement the policy in 2009 after the policy was issued. No less than 60% of counties had to be covered by the end of 2010, and all were expected to adopt the policy by 2011 (Ministry of Health and Other Eight Ministries 2009). The early adopters of the reform were expected to set up local interventions with consideration of the local context, and their experiences were summarized to help the other sites and inform the adjustment of the national policy and strategy. This feature of the reform policy demonstrates an appreciation for continuous change and emergent properties.

Implementing new policies involves changing institutions, relationships, and attitudes, suggesting that policy implementation can be understood as a process of changing the behavior of key health sector actors (Edgar et al.

2001). By adopting the policy, different actors at various levels may change their behaviors in different ways that can produce positive or negative effects on the system. Meanwhile, national policy strategies may change with feedback from local experiences and local implementation plans, which also keep changing as a result of learning from pilot projects.

The central government guidance on implementation of the essential drug depicts a clear picture of the implementation process. As planned, the essential drugs system would flow linearly from definition of the essential drug list, production and tendering for drugs on the list, distribution and pricing of essential drugs, delivery and use of essential drugs, and monitoring and supervision of the implementation process. The ultimate purpose or outcome of the system is to deliver safe, effective, and affordable drugs to local communities, promote rational use of drugs, lower drug costs and improve the health status of the people (Ministry of Health and Other Eight Ministries 2009).

According to the government model of how the policy will proceed, certain actors are engaged in each part of a linear process (Figure 3 - 1). The policy is predicated on each unit in the flow chart behaving as prescribed. Clusters of government actors work on policy making, overseeing implementation, and monitoring and regulation. Commercial companies have signed framework contracts with local governments to produce and distribute essential drugs. Hospitals and providers deliver drugs to patients. Finally, local offices under the New Cooperative Medical Scheme (a publicly-funded rural health insurance scheme established in 2003 and scaled up nationwide by 2008) reimburse provider and hospital services and drug costs. As shown in Figure 3 - 1, the relationship between these actors can be categorized into two types; a governance- and accountability-oriented relationship or a contract- and service-based relationship. If all actors perform their roles well, connections

and relationships between them will contribute to the realization of the ultimate system goal as described above.

In practice, different actors may have their own objectives and roles that motivate their policy response (

Table 3 - 1). Even for actors sharing similar objectives, such as the central government actors, there are sets of actors within this larger group that have different interests and objectives and will respond differently to the essential drugs policy. For example, central government actors may be more concerned with budgets, wage considerations for health workers, sustainability of the insurance scheme, the selection of drugs and quality of care, or seeking harmony among the other key actors. Table 1 tries to anticipate some of the known objectives of formal actors, and there may be more hidden objectives, as well. Actors and groups of actors interact at different levels and form small subsystems, and these subsystems will also interact together and adapt to changes of the outside environment. The interdependence and change over time between actors and subsystems contribute to the complexity of the implementation process (Figure 3 - 1).

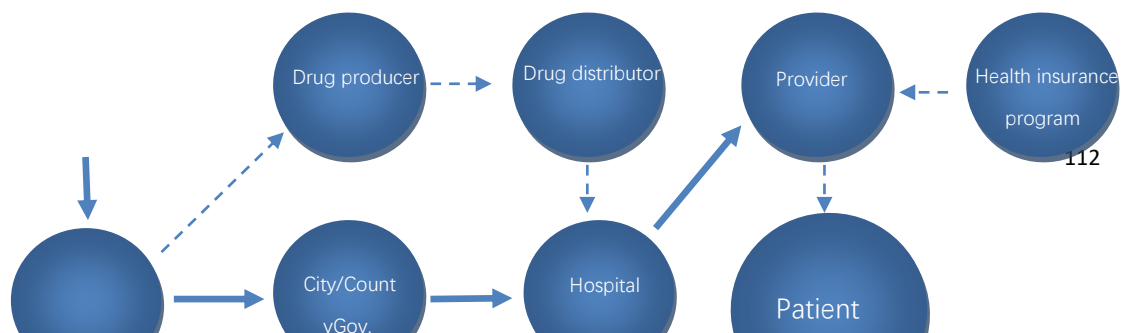


Figure 3 - 1 Key actors in implementation of the essential drug policy

Note: solid arrows stand for relationship of governance and accountability; dotted arrows stand for contract-based or service-oriented relationship.

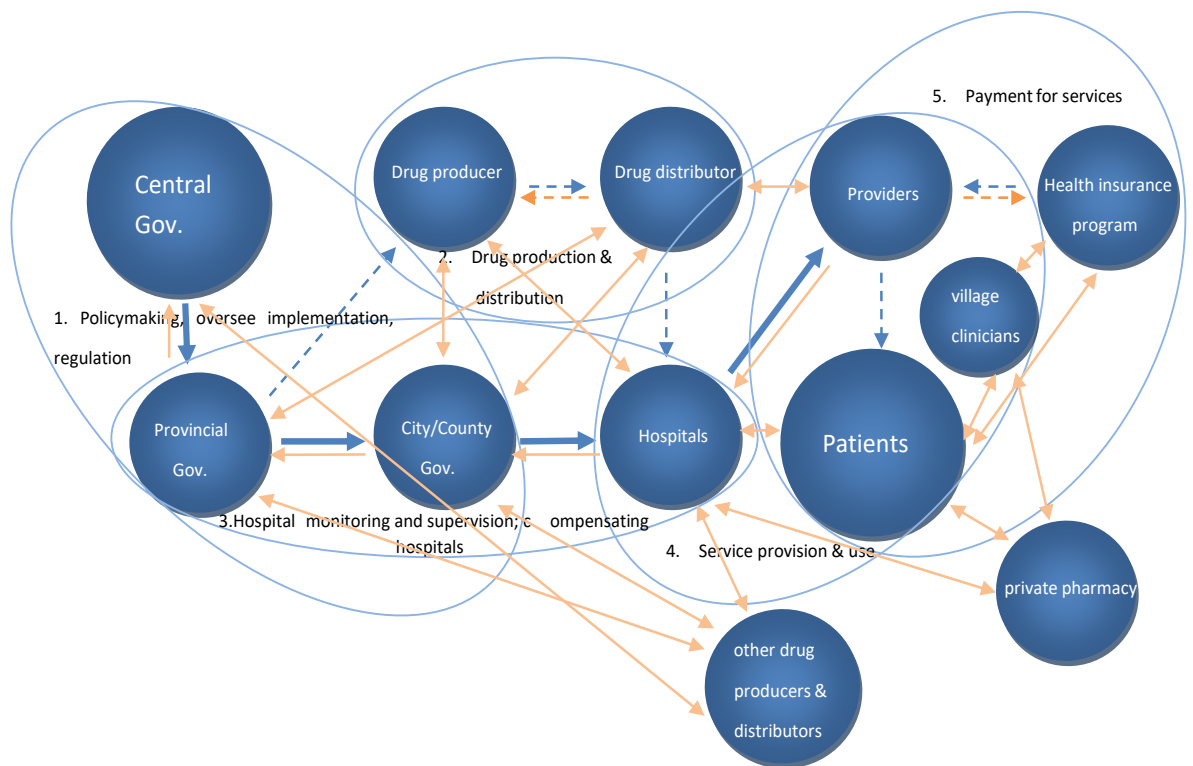


Figure 3 - 2 Key actors and their interactions in the lens of complex adaptive systems

Note: reciprocal arrows stand for connections between key actors, some of which serve as basis of feedback loops.

Table 3 - 1 Main actors and their objectives, roles and policy responses

ACTORS	MAIN OBJECTIVES	ROLES	POLICY RESPONSES
CENTRAL GOVERNMENTS (9 MINISTRIES)	Build up a national essential drug system, control drug costs, improve access and affordability of essential drugs, ensure satisfaction of other key actors	Policy making, defining the essential drug list, overseeing policy implementation	Different ministries have different options. E.g. Ministry of Health for essential drug list defining and overseeing implementation, Ministry of Finance for compensation plan, and National Development and Reform Commission for drug pricing
PROVINCIAL GOVERNMENTS	Ensure supply, delivery and use of essential drugs	Organize implementation of essential drug policy	1) make implementation plan; 2) organize bidding and contracting with drug companies
MUNICIPAL/COUNTY GOVERNMENTS	Supervise, deliver and use essential drugs	Provide compensation to hospitals, regulate essential drugs' use in hospitals	1) implement policies; 2) coordinate different government agencies at local levels; 3) some government agencies (not health authorities) may "pass the buck"
DRUG PRODUCERS	Win the bid and make profits	Produce safe and quality essential drugs	1) reduce drug prices to win a bid; 2) give up a bid if bidding prices are too low; 3) reduce production costs by lowering quality standard; 4) collude with other producers and purchasers on bidding
DRUG DISTRIBUTORS	Win the bid and make profits	Ensure timely, effective delivery of essential drugs	1) ensure enough volume, 2) keep distribution costs down
HOSPITALS AND VILLAGE CLINICS	Maintain operation and income, provide quality care, improve patients' satisfaction	Procure and use essential drugs, advocate the policy	1) keep enough stock of essential drugs, 2) avoid financial loss; 3) find ways to compensate loss caused by "zero markup policy" when the government budget is not enough, such as buy sub-quality or fake drugs, charge more from patients for other goods/services, increase volume of other goods/services, and negotiate other subsidies from government
PROVIDERS	Maintain income level, provide quality service, ensure patients' satisfaction	Explain to patients about the policy and Prescribe essential drugs	1) avoid income loss; 2) lose incentives for providing services after the implementation of performance-based salary; 3) complain about unavailability of drugs; 4) find ways to compensate their financial loss (such as seeing patients privately or similar choices as hospitals)
PATIENTS	Get quality drugs at low prices	Pay for services and get the drugs they need	1) no response because they do not know the policy; 2) complain about not getting the drugs they need; 3) go to private pharmacies or upper-level providers

HEALTH INSURANCE PROGRAMS	Ensure safe use of insurance funds	Use the essential drugs list as pharmaceutical benefit package	1) advocate use of essential drugs; 2) inspect hospitals on use of essential drugs; 3) change the rules about whether or how to reimburse for non-essential drugs; 4) redefine rules on price limits and/or volumes of other goods/services
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In

Figure 3 - 2, five circles are overlaid on the original mapping of actors in implementation of the essential drugs policy, dividing the system into five interdependent and interactive system parts. Circle 1 includes all the government actors who are mainly involved in policy making and the selection, procurement and regulation of drugs. Circle 2 includes drug producers and distributors responsible for production and distribution of essential drugs. In circle 3, local government agencies need to compensate hospitals for giving up drug markups, and also monitor and supervise the policy implementation at hospital level. Circle 4 includes the core functions of supply and use of services by health providers and patients, as well as their immediate supervision by hospitals management. In circle 5, local health insurance and patients pay for essential drugs delivered by providers. These are five functional groups of the essential drugs system. They are acting on different levels, but with overlaps and interactions. For instance, circle 1 and 2, and circle 2 and 4 form contract-based relationship through bidding and procurement processes, whereas circle 1, 3 and 4 links to each other owing to the existence of governance and accountability between the actors.

In

Figure 3 - 2, formal links between actors as defined by the official document on the implementation of the essential drugs system have been depicted with thick arrows. There are informal links between these actors as well, as shown by the thin arrows. In China, as elsewhere around the world, there are other semi-formal or informal actors who are very active in the local health market, such as village clinics, private pharmacies, village clinicians and traditional healers (Bloom et al. 2011). The official document does not mention these actors, but they will be influenced by implementation of the essential drugs policy and respond to the changing environment in ways that can also influence the outcomes of the policy reforms. The existence of these “invisible” actors outside the formal institutional framework also contributes to a more complex health system. Meanwhile, the central government has decentralized the power of tendering to the local governments. Most localities have established new agencies to manage the tendering process, and the

emergence of a new power organ and its links with drug manufacturers may nurture rent-seeking behavior at local level. In the past, hospitals purchased drugs from drug suppliers directly, but now the direct links between them are cut off. There are possibilities that new links driven by profit may be formed. Drug producers and distributors outside the essential drug supply system (named as “other drug producers and distributors” in Figure 2-8) may try to exert pressure on governments agencies and continue to influence hospitals and providers’ clinical decisions.

In

Figure 3 - 2, the reciprocal connections between formal and informal actors may form positive or negative feedback loops, which accentuate or moderate changes brought by policy implementation. For instance, changes of providers’ prescription behaviors may influence patients’ use of medicines. Patients’ responses to the changes may influence hospitals’ management rules, which further change providers’ behaviors.

In the above narrative, it is apparent that policy implementation is a process of adaptive behaviors of various actors at multiple levels. Changes brought about by adaptation of actors may be followed by negative and positive results, which impact on implementation. Policy strategies and plans can be emergent and subject to continuous change rather than fixed and preset. As a result, predictability and control is low. Evaluation of the essential drugs policy is more of a dynamic learning process aiming at generating knowledge for further policy improvement than static judgments on a fixed model and making judgment. A complexity perspective is well-suited for such a dynamic policy.

3.1.3 Methods

As part of a national evaluation program, this scoping study has been positioned to observe and document key issues and experiences of the initial implementation of the essential drugs policy in rural China. Since the initial implementation process is full of adaptive changes and intriguing relationships

between key local actors, qualitative methods have been selected. Compared with quantitative methods, qualitative methods are better suited to study new ideas and explore complex phenomena (Minichiello et al. 2004). Case study methods are considered to be most helpful as the first step to generating knowledge about an unknown phenomenon (Yin 2004). Anderson and colleagues argue that a case study can help knowledge development at any level, and it should be paired with complexity theory to study systems (Anderson et al. 2005). Therefore, a case study approach was adopted in the study. Semi-structured key informant interviews were chosen as the most suitable method for data collection.

Three rural counties in western China were identified as the study sites. They are among the 592 districts and counties on the list of national poor districts or counties entitled to national poverty relief funds. The current list was made in 2001. The three counties are no longer poverty-stricken. With development funds from the government and international agencies, the counties have become pioneers in experimenting with new models for national reform interventions. The essential drugs policy has been formally implemented in all three with two distinctive intervention approaches. The three counties have similar geographical and demographic features and are in the same economic range — middle and upper middle income counties (see Table 2 for details), so that comparison can be made. The site visit was conducted at the end of December 2010, when three counties had implemented the policy for at least 3 months. Ethical approval has been obtained from the Ethical Review Board of CNHDRC before the field trip. Altogether 24 people were interviewed, including heads of county health bureau, division chiefs in charge of the implementation of the essential drugs policy, central township health center chiefs, doctors (including village clinicians) and patients. Interview transcripts and extracted information from policy documents and reports provided us with rich data for analysis. The data were analyzed by using a theme analysis method (Bazeley 2007). With perspectives provided by understanding of complex adaptive systems, data were interpreted and synthesized in the following section.

3.1.4 Implementation of the essential drugs policy in three rural counties

(1) Divergent and unpredicted outcomes of policy implementation

Although the three counties have similar geographic, economic and institutional contexts and had just launched the policy implementation at the point of our visit (see Table 3 - 2), we observed different and unintended outcomes of policy implementation.

Table 3 - 2 Basic facts about implementation of the essential drug policy in the three countries

County	Geographic location	Per capita GDP*	Key demographic Features	Population Served by the THCs visited	When policy implemented	If non-essential drugs are used
County A	Remote mountainous area	22,500 Yuan (\$3,519)	Ethnic minorities mixed with majorities in communities	26,000	6 months	yes
County B	Mountainous area	13,130 Yuan (\$2,053)	Ethnic minorities mixed with majorities in communities	28,000	3 months	yes
County C	Remote mountainous area	13,346 Yuan (\$2,087)	Ethnic minorities mixed with majorities in communities	14,000	3 months	yes

*Per capita GDP on a country level was 29,936 Yuan RMB (\$4,682) in 2010.

All the GDP data come from the website of the National Bureau of Statistics of China

<http://www.stats.gov.cn/>

County A is located in a remote rural district of a comparatively developed municipality in southwestern China. The district has developed various social initiatives funded by the government and international agencies in the past 20

years. Coordinated by local health authorities, centralized bidding and procurement has been practiced by local township health centers since 2002 in a way that demonstrates prior self-organizing behavior at township health centers. Seven township health centers jointly formed a bidding and procurement group, with township health center chiefs overseeing the process and making final bidding decisions. This practice effectively controlled drug use and drug prices in the district.

As demonstrated by our interview of the director-general of the District Health Bureau, per capita out- and inpatient costs in the district was the lowest among 9 districts of the municipality. With the initiation of the new essential drugs policy, the township health centers can only choose drug producers and distributors from the list provided by the municipal government. Initial problems were high bidding prices for essential drugs and incompleteness of the essential drug list as perceived by doctors and patients. An increase in price was witnessed for 186 essential drugs as compared to the prices before policy implementation. About 1/3 of the drugs in common use by the local people cannot be found in the list, and 1/3 drugs on the list are rarely used.

“Separation of drug income and expenditure of township health centers” and “performance-based salary” were both implemented as complementary policies to the essential drugs policy, to compensate providers for giving up income generated from drug sales and encourage development of township health centers. The purpose was to provide more incentives for hospitals to develop themselves and for doctors to put more energy into improving service quality rather than increasing the volume of services. With direct financial compensation from the local public finance unit and regulatory efforts by local health authorities, drug prices to patients and availability have been kept almost the same as before implementing the policy, as shown in the interview with the township health center chief. As a result, the township health center did not have too many difficulties in adopting the policy. Outpatient visits in the hospital increased 20% as compared to the same period one year prior. However, the number of inpatients remained the same, although inpatient drugs were also covered by the local New Cooperative Medical Scheme.

Providers' attention had moved to quality improvement and development of professional skills, as observed by the township health center chief.

Counties B and C are located in mountainous areas of a large agricultural province. Both have been pilots for various national reform and development programs. For a long time, local health development has relied on local finance from city and county governments. Due to lack of public funds, township health centers were on their own to maintain operation. Before implementation of the essential drugs policy, the two township health centers were selecting their drug suppliers and defining drug markups on their own and without external supervision. As a result, the centers reported that they have been influenced greatly by use of essential drugs in terms of hospital operation and income.

County B reported that drug prices paid by patients were on average 20% lower than before implementation of the new policy. Total hospital revenue in 2009 was 1,320,000 Yuan (\$203,076), with drug revenue accounting for 70%. By the end of December of 2010 (3 months after the policy implementation) the total revenue was 1,900,000 Yuan (\$292,307), with 57% coming from drug sales. The share of drug revenue decreased since adoption of the essential drugs policy in the province in May 2010. Since May 2010, the local government has decided to provide the hospital with about 147,000 Yuan (\$22,615) annually as financial compensation for implementing "zero drug markups" policy. The compensation plan has been made on the basis of average drug profits of health facilities in the past three years. According to the old drug policy, township health centers were only allowed to mark the sale prices up by 15%. So the local government simply calculated the average drug income of the township health center as 15% of its average drug revenue in the past three years. However, the true drug markup in the township health center was much higher than 15%. Although the total hospital revenue increased, net gain decreased with decreasing drug revenue. As reported by the chief, the hospital suffered a substantial financial loss from implementing the new policy. Besides revenue loss, the hospital also saw an increase of dissatisfaction among patients, and growing resentment and lowering morale

among doctors. As estimated by the township health center chief, about 10% of patients went to private pharmacies directly after they obtained prescriptions from the doctors, because they could not find the drug they normally use in the essential drug list. Doctors were often scolded by their patients for not meeting their needs.

Apart from negative outcomes of the policy implementations, unintended consequences of policy implementation in County B led to impaired performance. For instance, before adopting the policy, the township health center in County B withheld payment to four drug suppliers it had contracted with in order to save funds for development of the institutional infrastructure. It announced to the drug supplier that the uncompensated drugs would be considered to be a “loan” that they would repay by purchasing drugs from the suppliers in the future. Subsequently these four companies were bumped off the provincial government’s list of defined producers or distributors, so they could no longer provide drugs for the hospital to recoup the loan. Now the hospital must pay back over one million Yuan (\$153,846) to the four suppliers.

County C had the same issues of outflow of patients and decreases of hospital revenue, only to a milder degree. The township health center also reported unavailability of common drugs in the essential drug list and stock-outs of the essential drugs. It is located in a mountainous area over 200 kilometers away from the provincial capital, with scattered towns and villages. There are only 5 private pharmacies in the county. Many villagers need to travel by motorcycle or bus to get access to the nearest hospital, so unavailability of drugs will greatly affect their lives. The township health center chief thought the low bid price of a drug would either cause the contracted manufacturers to stop producing the drug or produce sub-quality drugs, leading to a stock-out and patient dissatisfaction with the efficacy of the cheap alternatives. Doctors in the hospital and village clinics had a rather dismal view of the current compensation scheme because their salaries were lowered after the policy implementation.

(2) Adaptive and self-organizational behaviors of some key actors

We observed self-organizing adaptive behaviors to the essential drugs policy in the township health centers, even though they had just begun to implement the policy several months earlier. Due to incompleteness of the essential drug list, the township health centers were using some non-essential drugs to meet patients' demands. Health authorities in three counties had set up a buffer period for township health centers to use up or dispose of all non-essential drugs (drugs not on the essential drugs list), usually 2 to 3 months'.

Meanwhile the government of the province where county B and C are located has expanded the national essential drug list to cover more drugs that reflect the local needs. Hospitals in the three counties also developed measures to assess doctors' performance as required by local governments. Some general measures were attendance rates, service volume and quality, and patients' satisfaction, etc. Performance-based salary usually accounts for 30% of the total income. Chiefs of these township health centers mentioned strained doctor patient relationships due to unavailability of certain drugs in the essential drug list. They also complained about doctors lowering the patient throughput after the switch to performance-based salary. Administrators of the township health centers worried about reduced outpatient visits and lower hospital income because patients in the townships were going to upper-level hospitals or private pharmacies to get a wider selection of drugs.

The hospitals were actively seeking ways to adapt to the situation. The chief of the indebted township health center in county B was actively figuring out new revenue sources. He set up policies providing incentives for doctors and nurses to admit more outpatients (20 Yuan per patient for doctors and 10 Yuan for nurses). The incentives scheme worked. The number of inpatients in quarter 3 of 2010 was already more than twice that of the previous year. This type of adaptive and self-organized behaviors may negate the hoped-for cost savings. Interviews of inpatients in the township health center showed that those patients who were given unnecessary inpatient care were happy about

the fact that they got more attentive care inside the hospital, and faced a better financial picture because the insurance reimbursement from the new Cooperative Medical Scheme was more generous for inpatient stays (75% of costs are reimbursed for hospital stays compared to 50% for outpatient care).

(3) Non-linear and dynamic changes in the implementation process

Due to adaptive behavior by various key actors, the implementation process in the three counties is dynamic and not a simple linear response to the policy change as was implied by the formal institutional framework established for the essential drugs policy. This dynamism is demonstrated by the evolution of drug distribution in the three counties. The municipality where county A is located has defined prices of essential drugs and decided on potential distributors for all the nine districts under its jurisdiction. Distribution costs are included in prices of essential drugs. County A could select from over 60 producers/distributors listed on the webpage of the municipal government. It chose 13 producers/distributors within or near the district and ensured that there are two distributors for each specification of drug. With timely supply of essential drugs, the township health center in county A had a high use rate of essential drugs (about 80-90% of drugs distributed are from the essential drugs list).

The province where counties B and C are located has set up a coordinating office, in charge of “unified bidding, unified distribution, and unified pricing” of essential drugs. Under the highly centralized bidding, pricing and distribution policy, counties B and C were assigned only one distributor each. Distribution costs are set at 5% of drug prices. Although the distributor is a big enterprise with strong capability, covering hundreds of miles to send essential drugs to remote counties like B and C proved costly. Distribution costs exceeded revenue which discouraged the distributor from sending in small stocks demanded by township health centers located in mountainous towns. Stockouts lowered utilization rates of essential drugs. The township health center in county B was using around 60% of the drugs it distributed from

outside of the essential drugs list, while the corresponding rate in county C was 40%. We found that county C entrusted the Township Inspector General, (a public watchdog in every township statutorily responsible for enforcing disciplinary regulations for all public servants, including township health center chiefs) as the main supervisor for implementing the essential drugs policy. This may explain why use rate of essential drugs in county C was higher than county B. The introduction of a new actor achieved better monitoring effects by putting pressure on township health center chiefs.

The above example shows the dynamic and non-linear distribution processes in different counties. Instead of the orderly linear process of dominoes laid out in Figure 1, new actors and processes arose over time. Provincial or municipal governments interpreted the essential drugs policy in different ways and made different implementation plans, which reinforced or moderated changes desired by the central policy makers. At the same time, other key actors like township health centers were not just adapting to the implementation process, but actively finding ways to change the system, which produced positive or negative feedback loops influencing the policy adoption and adaptation.

3.1.5 Implications for implementation of the essential drugs policy at local level

By conducting the scoping study, we hoped to inform future studies that assess the health reforms. We knew at this stage local and central level decision makers hope to quickly get a sense of what happened at county level and hospital level. As evaluators and researchers, we were fully aware of being part of the complex system, for the interviews may have impacted on implementation processes on the local level. The complexity lens helps frame several policy recommendations for policy makers and policy implementers.

(1) Understanding local drug policy implementation as a complex process

Even with the same local institutional, social-economic environments, three counties witnessed different outcomes of the implementation. Unintended consequences arose. The implementation process was complex and unpredictable. Policy implementation involves a string of interactive and interdependent formal and informal actors and actor groups. They formed formal and informal links or relationships and made changes to adapt to the outside environment. Actions of these actors and interactions between them may decide the policy outcomes.

For policy makers and implementers, the main lesson is to apply complex adaptive systems thinking to how the policy should be designed and implemented. One way to do this effectively is to map out key actors in the health market, their objectives, links/relationship and possible policy responses, as was shown in Table 1. Expecting and recognizing unintended consequences is also critical, which emphasizes the importance of performing real-time monitoring and evaluation, with a focus on learning and adjusting policies rather than focusing on simply punishing failure or rewarding success. One must also be proactive in preparing for unintended consequences.

(2) Capture nonlinearity and diversity of policy implementation

There is a strong temptation to depict policy implementation as a linear and predictable process. However, due to the complexity of the health system, various actors may change their role in the system through adaptive behaviors. For instance, due to differences in local policy interpretation, local governments may design different local implementation plans. Therefore, policy makers, implementers and regulators need to capture the nonlinearity and diversity of policy implementation by tracking paths of implementation at the local level and making timely observations of implementation effects. This might imply that an effective mechanism needs to be established to document

variations and effects of implementation and feed the information back to those actors that can leverage changes in the system. In our research we learned that with encouragement from the central government, provincial governments in most places have customized their supplementary list for the national essential drug list based on local demands. Furthermore, some provinces have required local public finance at city and county level to readjust their compensation plans for township health centers, to help the hospitals deal with big financial losses. Our study demonstrates that policy makers have responded idiosyncratically and not as predicted.

(3) Pay close attention to key actors' response and take proper approach to deal with them

Various actors in the system adapt to policy changes at the same time. Close attention should be paid to policy responses, especially by the key actors. Health facilities were the main responsible agents for policy implementation at the local level. Health facilities respond to the new policy by taking actions to try to optimize their environment, forcing reactions by other actors. These policy responses should be closely followed. Certain measures should be taken to deal with negative policy responses. Simply clamping down may not always be the best approach. For example, township health centers made patients their allies in driving up admission rates to compensate their loss in implementing the policy. Anticipating the range of behavioral responses with more complex models of reactions will improve policy.

3.1.6 Conclusions

The essential drugs policy is a new policy launched with the new round of reform of the Chinese health system. The implementation of the policy has encountered many challenges related to the complexity of the health system. The policy implementation process involves multiple actors. With diverse objectives and responses to changes, these actors have developed additional sub-systems through interactions with each other and adaptive behaviors.

Interdependence and adaptive behaviors of the various actors in a dynamic implementation process has produced a variety of outcomes that vary across settings, including some unintended consequences. Those outcomes feed back to the system to influence policy implementation and trigger more adaptive behaviors. Success in achieving the public objectives of the essential drugs policy is likely to come through close follow-up and better anticipation of the range of health system reactions. This approach involves understanding the objectives and responses of all the key actors in the system, using data for disclosure and learning, and taking advantage of positive adaptive behavior of the different actors. Using the lens that complex adaptive systems offer, policy makers and implementers will be able to grasp the nature of implementation of the essential drugs policy, and better cope with emergent changes and unexpected adaptations in such a dynamic and complex system.

3.2 Conceptual Indicators Framework for Strengthening the Chinese Health System

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Abstract

In 2009 the national government of China launched massive health reforms, together with other social and economic reforms. For the first time, evaluation was included in the draft national plan health reforms and development—the so-called “12th Five-Year National Plan for Health Development (2011–2015).” The Chinese and Canadian researchers, with the support of the International Development Research Centre, Canada, helped to facilitate a deliberative process by various actors by conceptualizing an indicators system and mapping out key questions to be addressed by evaluating implementation of the national health plan. The conceptual indicators system serves as a platform for users and implementers of evaluation program to understand needs for evaluation better and sharpen focus on more prominent dimensions such as equity and contextual analysis.

For decades, evaluations were judged in terms of technical quality, methodological rigor, and utility, and actual use of evaluations was mostly ignored (Patton 2008). With increasing emphasis on accountability and evidence-based decision-making, there has been a surge of need for utilization-focused evaluations. Utilization-focused evaluation is “done for and with specific intended primary users for specific, intended uses” (Patton 2008, p. 37). In conducting such type of evaluations, evaluators are supposed to interact and work with intended users, helping them to understand needs and identify the most suitable content, model, method, theory, and use of a particular evaluation project. Mapping out intended users, different evaluation purposes, key questions, and factors affecting use shall come before finding evaluation approaches and methods. An overall framework systematically capturing complexities is key to making evaluations useful for the intended users. It is the basis for the design of an evaluation and provides directions for implementing evaluation activities. An evaluation framework can be used practically for summarizing and organizing main processes of effective evaluation (Centers for Disease Control and Prevention 2016)?

This paper documents the process of developing an indicator framework for evaluating health systems strengthening in China, providing a case on developing a utilization-focused evaluation thinking right at the beginning. Discussions in the paper are conceptual rather than operational, aiming to develop a platform for engaging evaluators and target users of evaluation in debates.

3.2.1 Rationale for a Conceptual Indicators Framework

Since the early 2000s, the Chinese government has begun to pay increasing attention to health system strengthening and has established various reform programs in accordance (Alva et al. 2009). In April 2009, it announced the launch of a comprehensive health systems reform agenda, with the goal of achieving affordable universal healthcare by 2020 (Yip et al. 2012). Some health policymakers describe the reform as “a gigantic systems engineering

work,” featured with great complexity. It is meant to initiate changes in four main functional parts (financing, public health, healthcare service delivery, and essential drugs), try to establish appropriate mechanisms to maintain functions of these subsystems, which call for nuanced design and careful implementation to balance interests of different actors and agents, and build up relevant systems and mechanisms.

A consistent and systematic framework is important for assessing the performance of health systems (Murray & Frenk 2000; WHO 2000). In 2011 a team of researchers from the China National Health Development Research Center (CNHDRC)—a national health policy thinktank, in collaboration with the International Development Research Centre (IDRC) of Canada developed an indicator framework for assessing health systems strengthening in China (2011–2020). This project coincided with another project on indicators system for the 12th Five-Year Plan (2011–2015) for Health Development commissioned by the Department of Planning and Information, National Health and Family Planning Commission (formerly known as the Ministry of Health) of China. This was the first time that the national health authority in China formally commissioned an evaluation of 5-year plans for health. Policy accountability was stressed in public service management reforms, and evaluation began to be viewed as a tool for supporting evidence-based decision making. Requirements for monitoring and evaluation were described vaguely in a few lines at the end of the draft health plan, and the health planners were not so sure about what evaluation can do for the plan. In the draft document prepared by the health planners there were already some indicators identified through a deliberation process.

Against such a background, the CNHDRC and Canadian experts decided to conceptualize an indicators framework of practical use to the health decisionmakers, that is to help the health planners, program designers, and local decisionmakers to sort out draft indicators and better understand their need for evaluation.

3.2.2 Framing an Indicators System

After discussions with key policymakers and experts, a general utilization evaluation approach was taken to develop the indicators system, with engagement of target users of the indicators. The research team promised to develop a framework by collectively working with decisionmakers and program implementers at central, provincial, municipal, and county levels. Several principles were agreed to keep the evaluation indicators more of practical use. First, the framework needed to reflect values and priorities of current health reforms. Second, the framework had to capture needs of different parts and layers of the Chinese health system. Third, the framework could be useful as a common ground to facilitate communications between various stakeholders and accommodate future changes.

With its focus on understanding evaluation needs of users, a utilization evaluation approach is suitable for use in the Chinese context. As highlighted in the discussion section, over time, we hope to apply a developmental evaluation approach (Patton 2011) to health systems reform in China. Such a developmental approach is appropriate given that an incremental reform approach has been successfully applied for years in developing social innovations and promoting social changes (Xiao, et al. 2012). We believe that a developmental evaluation approach applied over time can help build systematic understandings of requirements for innovation development in the complex process of the Chinese health system reform and development. This paper, however, confines its focus to describing the comprehensive indicator framework: over time, the evaluation team at CNHDRC will implement this framework in a variety of national and local contexts to learn about the impacts of health systems reform on health inequities in China.

A graphic framework informed by theories by Donabedian (1980), depicted in

Figure 3 - 3, was developed to serve as a common ground for initial discussions. After careful studies of policy documents and rounds of consultations with five key health policymakers working in the NHFPC; four local program implementers in Chongqing, Shaanxi, and Anhui provinces; and eight researchers and faculty members based in Beijing and local provinces, key questions for each indicator domain

(

Figure 3 - 4) were prepared.

In the 11th Five-Year Plan (2006–2010), the national government attached great importance to equity and social justice and embarked on preparation for universal health coverage. In the health plan issued in 2009, universal health coverage was formally proposed. As agreed by all policymakers and program implementers, equity was a fundamental value for health reforms and development during the 12th Five-Year Plan period (2011–2015). Gaps existed in life expectancy, maternal and child mortality in rural/urban areas, in different regions/provinces at different socioeconomic development levels and among population groups with different income level and residential status. Different financial protection schemes were designed for rural/urban patients and employed/unemployed patients, but in favor of patients with better affordability. Less capable rural health service delivery systems and poorly developed primary healthcare discouraged poor communities' access to essential health services.

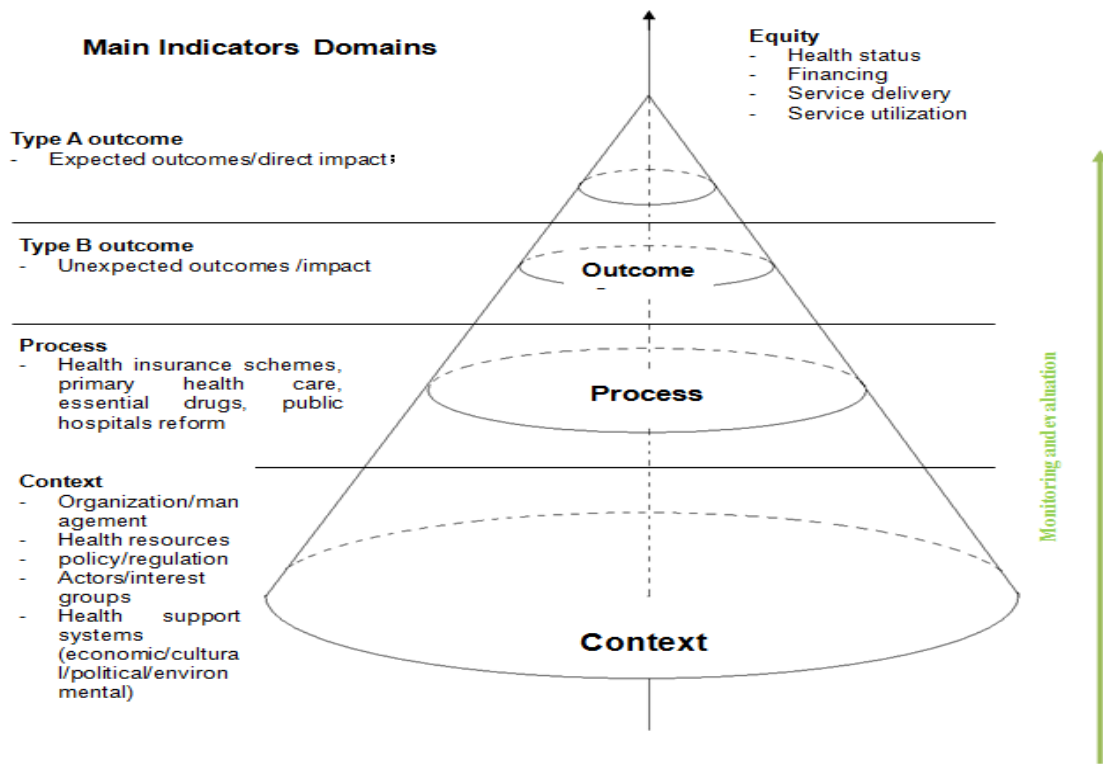


Figure 3 - 3 Conceptualising indicators domains

The conceptual model is in iceberg shape with three indicator domains. Top of the iceberg is the outcome/impact domain, which is the part of most concern to key actors, such as policymakers and the population. There are two types of impacts: visible (short-or medium-term) impacts and unintended and long-term impacts. The former includes intended and immediate impacts, whereas the latter includes unintended impacts or impacts that would take a rather long time to show up. Although impacts occupy the tip of the iceberg for the sake of visualization of the model, it does not necessarily mean that this part is small or insignificant. On the contrary, outcome/impact is a critical aspect of the whole framework. As agreed by the policy stakeholders, the conceptual framework needed to pay attention to unexpected impacts of a health policy or public program and the process evaluation needed to explore processes/mechanisms underlying the unintended impacts.

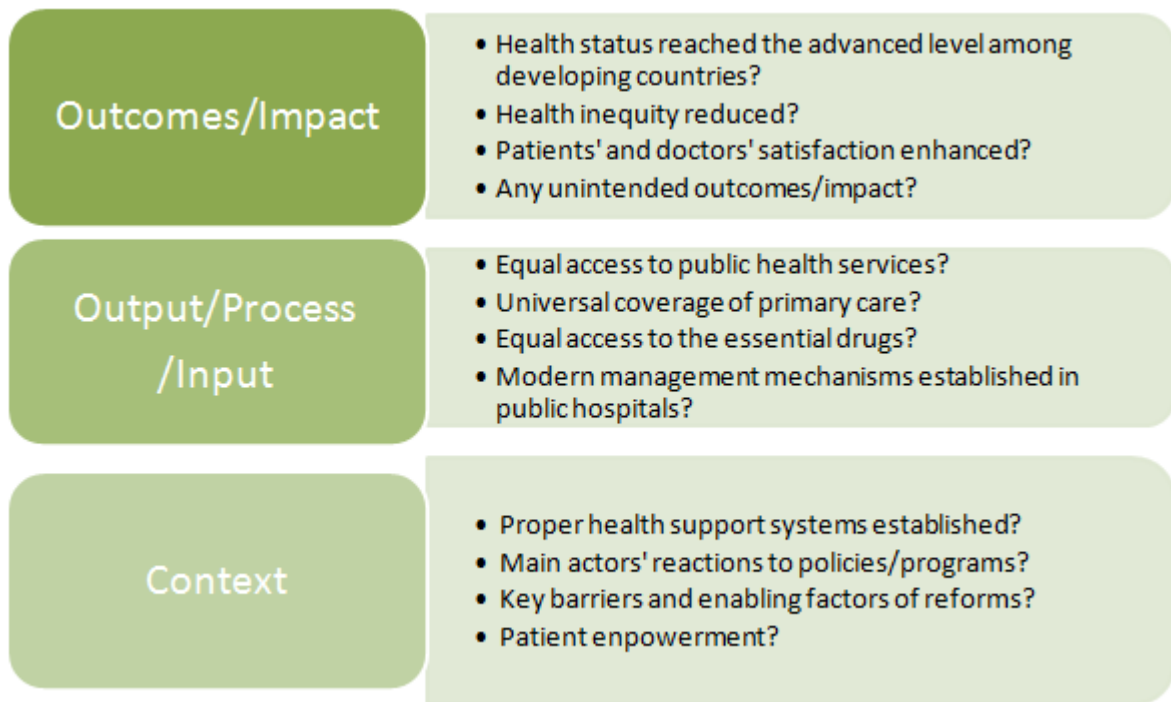


Figure 3 - 4 Key policy questions addresses

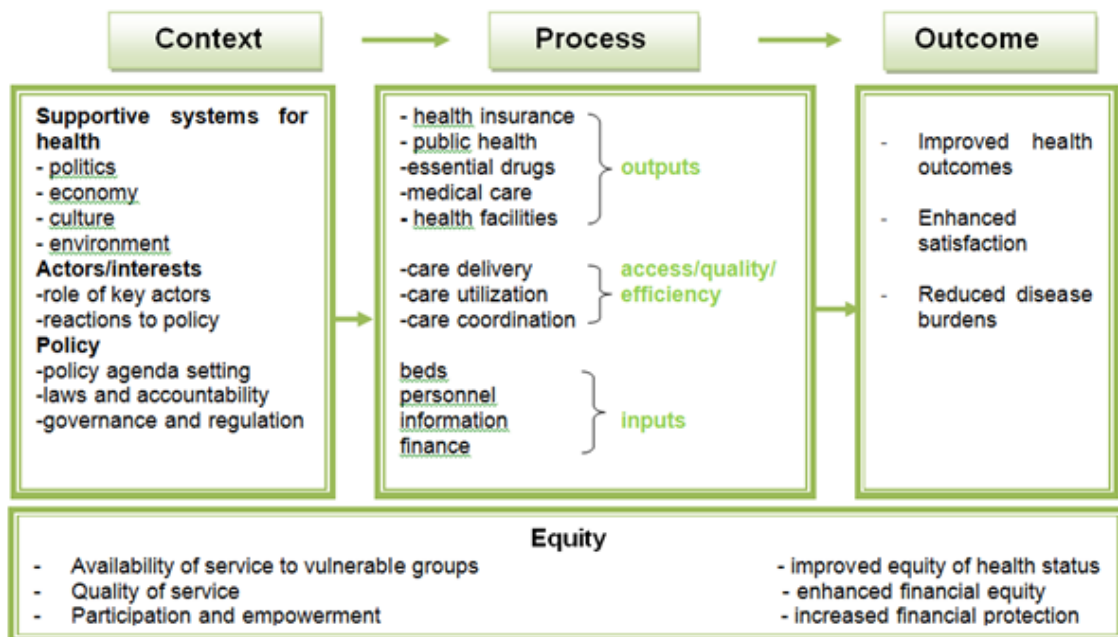


Figure 3 - 5 Framework of indicator domains

The middle part of the model is the process domain, which mainly refers to the monitoring and evaluation of performance of health system reform and development. This part centers round key interventions, programs, projects, and tasks under the current health reform. A set of performance indicators will

be generated and used to monitor and evaluate performance of the reform and health development plan. The Center for Health Statistics and Information (CHSI) of the Ministry of Health has been working on this part. It has developed a framework and put it into use to meet information needs of the health policymakers. Our process domain has tried to accommodate the current CHSI framework.

The lowest part is the context domain, referring to contextual or local information that will inform the monitoring and evaluation of health reform and development on national level or in a certain province. The context-specific information includes current status of health support systems, which can be categorized into political, social, cultural, economic, and environmental systems. Contextual questions will be explored, including whether Universal Health Coverage targets were included in the local economic and social development plan, the strength of the public finance system, distribution of ethnic minorities, and also issues of culture or customs that might shape the intervention. These systems have direct influence over the healthcare system. Actors/interest groups refer to those who are actively involved in or passively influenced by health reforms and development plans and programs. We need to understand their role in health system strengthening and politics and interests represented by them, which may influence health policy making and implementation. Information concerning health resources can provide us with the current status of the national health system or local health delivery system in terms of health infrastructure, human resources, and health funds. Organization/management refers to mechanisms or management systems guiding the national health system or local health delivery system.

To link the conceptual framework with current needs of the health system reform and strengthening, we mapped onto the framework the key questions posed by the central policymakers for the new round of health and development of the 12th Five-Year Plan for Health (see

Figure 3 - 4), mainly concerning the outcomes and process domain. Two questions are added in the outcomes/impact part, which are about actors' satisfaction and unintended outcomes/impact of the health reform. We also developed questions for the context part based on our understanding of the system.

According to the key questions, we identified key indicator domains (see

Figure 3 - 5). One key focus is the process indicator domain: this domain measures the “process as outcome” aspect of the health system. This part mainly concerns health system performance evaluation, namely performance of urban and rural healthcare delivery systems. Four indicator dimensions were chosen based on literature reviews, consultations and discussions with national health planners, health reformers, and decisionmakers at the division-chief level, namely access to basic quality health care, efficiency of health delivery systems, and health equity for all, with a focus on the differences between rural and urban health systems. Equity, as an axis dimension, cuts through all indicator domains, to reflect an important perspective of the Chinese health policymakers’ current thinking behind health system strengthening.

3.2.3 Application of the Conceptual Indicators System

A detailed indicators framework for discussions was developed (Table 3 - 3) after consultations with policymakers and experts in relevant fields. The framework was used by the team in their proposal for setting up a national indicators system for evaluating the 12th Five-Year Plan for Health Reforms and Development (2011–2015) in September 2011. Discussions based on the framework were convened and feedback from policymakers obtained. The national health planners, health policy experts, and evaluators agreed that the indicator system for the national health plan should be embedded with an equity perspective and that contextual analysis was an important aspect of the evaluation of local health systems’ performance.

After discussions with the health planners, the evaluators understood that they hoped to use monitoring and evaluation of the plan as a tool for holding central and provincial health policymakers and program implementers accountable. However, it is difficult to do so in a decentralized and fragmented health decision-making setting. As a compromise, they invited different departments to submit core indicators for inclusion in the process domain and required the CNHDRC researchers to work on the proposed indicators and complement them with necessary indicators.

As a way to move forward, the central health planners included all 24 indicators (Table 3 - 4) proposed by various departments in the NHFPC in the draft national health plan and asked the CNHDRC researchers to propose some other indicators that could capture progress and measure outcomes in accordance with the objectives and main priorities defined in the plan. The evaluators consulted with the relevant departments and policymakers on different indicators and finally 24 other indicators were listed for the 12th Five-Year Health Plan (Table 3 - 5).

The 24 supplementary indicators finally included were reflecting trade-offs of various end-users involved. Indicators were grouped in accordance with different departmental responsibilities. Some questions about specific interventions posed by the central health planners

(

Figure 3 - 4) were not addressed or inadequately covered, such as essential drugs and public hospitals reforms. Given the stress of the health system reform on vulnerable population's access to essential health services, the indicators system included equity as an important dimension for evaluation of the national health plan. Though context indicators were missing from the monitoring indicators, the health planners encouraged the evaluators to include them in the final evaluation by asking the local provinces to provide

relevant data and information in their own evaluation reports.

Table 3 - 3 Proposed framework for discussions

Indicator domain	Targets	Measurements	Equity perspective
Outcome/ impact	Improved health status of the population	Life expectancy	Regional/urban & rural
		Under-5 mortality rate	Regional/urban & rural/migrant and other vulnerable groups
		Maternal mortality rate	Regional/urban & rural/ migrant and other vulnerable groups
		Incidence and death rate of key infectious diseases	Regional/urban& rural/migrant and other vulnerable groups
		Prevalence and death rate of key non-communicable disease	Regional/urban& rural
		Incidence of birth defects	Regional/urban/migrant and other vulnerable groups
	Increased Satisfaction of Key Stakeholders	Doctors and patients' satisfaction for quality, efficiency, availability, reimbursement of health services	Provincial/urban& rural/migrant and other vulnerable groups
	Reduced Disease Burden	Ratio of catastrophic health expenditure	Provincial/urban& rural/migrant and other vulnerable groups
		Reduced incidence of disease-induced poverty	Provincial/urban& rural/migrant and other vulnerable groups
	Unintended Outcomes	Unexpected outcomes caused by implementation	Urban & rural/provincial/vulnerable groups
Output/ process/ input	Improved Access to Primary Health Care and Health Protection	Universal coverage of and access to essential care (drugs, public health, medical services)	Provincial/urban& rural/migrant and other vulnerable groups
	Improved Care Quality/ Effectiveness	High-quality primary care, strengthened internal management of public hospitals, improved quality of care in secondary and tertiary hospitals	Provincial/urban& rural/migrant and other vulnerable groups
		Reduction of readmission and fatality rate	Provincial/urban& rural/migrant and other vulnerable groups
	Improved Health Efficiency	Institutional and systemwide efficiency, such as early interventions and shortened length of stay	Provincial/urban& rural/health facilities at different level

	Health Resources	Number of physicians, nurses, general practitioners (GPs), and other health personnel	Provincial/urban& rural
		Medical information systems	Provincial/urban& rural
		Health expenditures/public health inputs	Provincial/urban& rural
Context	Health Supportive Systems	Economic development, economic status of population groups	Provincial
		Hygienic rituals and customs, health awareness, and healthy behaviors	Provincial/urban& rural/minority/migrant and other vulnerable groups
		Health agenda setting process, health legislation, governance, and regulation	Provincial (municipal/county)
	Actors/ Relationship/ Interests	Main actors and their relationship with other formal or informal actors	-
		Actors' reactions to health reforms	-

Table 3 - 4 24 Core indicators for the 12th Five-year Health Plan

Domains	Indicators
Health Outcomes	Life expectancy at birth
	Infant mortality
	Under-5 children mortality
	Maternal mortality
Disease Control and Prevention	Reporting rate of legal infectious diseases
	Number of living HIV/AIDS patients and carriers
	HBsAg+ population as percentage of the total population
	Coverage of national expanded program of immunization at township level
	Awareness of major NCDs prevention and management
	Standard management of patients with hypertension
	Standard management of patients with diabetes
Maternal and Child Health	Management of under-3 children
	Coverage of prenatal care

	Coverage of hospital delivery
Health Inspection	Coverage of inspection of centralized water supply over 1,000 cubic meter per day
Financial Protection	Coverage of the New Rural Cooperative Scheme
	Payment ratio of listed items in the basic urban health insurance schemes
Medical Care	Average length of stay in tertiary hospitals
	Accordance rate of diagnosis at admission and discharge
Health Resources	Number of physicians per 1000 population
	Number of registered nurses per 1000 population
	Number of beds per 1000 population
Inputs	Share of per capita health expenditure in the total health expenditure
	Per capita fund for essential public health services

Table 3 - 5 24 supplementary indicators for the 12th Five-year Health Plan

Domains	Indicators
Public Health System	Coverage of nucleic acid detection in blood banks
Medical Service System	Number of beds and service volume by private health facilities as a share of the total
	Share of rural patients seeking care within a county
Financial Protection	Reimbursement of outpatient care
	Per capita public finance for health
Public Health	Number of tuberculosis (TB) patients detected and treated
	Coverage of management of drug-resistant TB at city level
	Share of county (city, prefecture) without iodine deficiency disorders
	Share of communities and towns conducting blood sugar testing
	Coverage of health assessment of elderly at or over age 65
	Coverage of management of patients found with severe mental illness
	Coverage of care of patients found with severe mental illness
Coverage of inspection of water quality in centralized water supply	

	projects
	Screening coverage of common gynecologic disease
	Screening for neonatal inherited metabolic diseases
	Prevalence of growth retardation among under-5 children
	Prevalence of anemia among under-5 children
	Health literacy of urban and rural residents
	Smoking prevalence of people at age 15 or above
Medical Services	Blood donation
Health Personnel	Number of GPs trained
	GPs per 10,000 urban residents
	Share of township health centers with GPs
Information Systems	Coverage of standard digital health records

3.2.4 Conclusion

This paper describes the attempts of developing a conceptual indicators framework for the Chinese health system strengthening in a short- and medium-term. A utilization-focused evaluation approach was taken to engage target users in framing key questions for evaluations and key components of an indicators system, so as to make the process more utilization-focused. The conceptual framework proposed in the paper did serve as an initial platform for engaging end-users of evaluation of the 12th Five-Year National Health Plan in exploring and improving the indicators system.

For a country in rapid political, economic, and social transition, China has embarked on radical reforms in health sector in recent years. For the first time, the country decided to include evaluation as a mandate part in the national plan for health reforms and development. Facilitated by the evaluators, users of the evaluation—national health planners, policy and program designers and implementers—reviewed questions they would address by implementing the plan and discussed openly about what they hope to achieve with the evaluation of the plan. The deliberative process convened and organized, with help of the evaluators, created a space for various actors to hold dialogue and

make changes. Although the indicators listed in the final 12th Five-Year National Health Plan were not fully based on the proposed indicator framework, the evaluators succeeded in bringing an utilization focus on evaluation.

3.2.5 Looking Forward

Looking forward, we think that the emerging evaluation community can contribute to enhancing health systems reform in China in the following ways: We do not see building a performance measurement as purely a conceptual or a data collection exercise. The challenge will be to develop the capacity to develop actions to act on this information. There are at least two critical questions as one builds on the conceptual foundation described in this chapter: What types of actions emerge from the collection and analysis of the data? What are the capacities and capabilities needed to “act” on the information from the performance measurement system described in this chapter?

Much of the focus of the conceptual framework has been from a standardized monitoring perspective: for example, collecting standardized, uniform data across the multiple provinces of China to assess performance of the health system. One key challenge going forward is to explore how strategically planned evaluations can be linked to data from national-level surveys to assess progress of specific interventions in affecting health inequities. It may be hard to assess “what interventions works for whom” just through monitoring datasets. Rigorously designed evaluations that are also informed from a utilization perspective, might be needed to help learning about “what works for whom.”

There has also been an increased appreciation among Chinese policymakers that evaluations can serve very different purposes. As noted earlier, one evaluation approach that we plan to implement is the developmental evaluation approach (Patton, 2011). Many of the health system reform interventions are implemented in settings where the contextual features that inhibit or exacerbate inequities are not well understood. One of the strengths

of the developmental approach is that the developmental evaluator works closely with the implementers of the intervention to help develop the implementation of the intervention in the specific contexts. Such a focus on developmental evaluation is relevant given both the complex dynamic realities of health system interventions and the heterogeneities of contexts in China and also the broader dynamic changes in the social, political, and economic conditions in China over the past few decades.

China is a diverse country with spatial distribution in both health outcomes as well as in the social determinants of health. One critical challenge as we build on the performance indicators described in this chapter is how to incorporate knowledge of spatial heterogeneities into the evaluation and learning framework for the China Health System reform effort. It is also possible that the drivers of health inequities might vary across the regions and provinces of China. One of the challenges going forward will be to explore if there is a need for more specific “local” measures that are focused on the “local” drivers of health inequities, in addition to a uniform core of indicators that are collected across China.

3.3 Explicit priority-setting of the National Program of Essential Public Health Services

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Abstract

Background. Since 2009, China has been implementing a national program on free provision of essential public health services. The national program has expanded its service categories and funding, consistent with China's commitment to universal health coverage. However, with slowdown of public investment in the health sector, the government has decided to disinvest in inefficient and unnecessary interventions and optimize the service package. Researchers in the Chinese national HTA agency have been asked to support the decision process with a systematic approach of assembling and presenting relevant evidence.

Method. The researchers use multi-criteria decision analysis (MCDA) to analyze value dimensions in public health issues, and developed an evidence matrix for deriving recommended priorities. Supported by HTA tools, they appraise interventions and services through literature reviews and field studies, and project the budget impact of potential service adjustment decisions. Further, the results of a deliberative process involving key stakeholder groups are taken into account in making the final recommendations.

Results. Based on the expert consultation, evidence reviews and stakeholders' scoring, recommendations on adjustment and disinvestment of a few services are provided together with the evidence matrix developed. The change did not happen as planned due to fierce resistance to policy change in the policy consultation process.

Conclusions. The HTA practitioners made a bold attempt to supplying systematic evidence for the major change of an important national public health policy. Even by using tools like HTA and MCDA and organising open discussions of values and evidence, such an attempt suffered setback in reality in a country unfamiliar with open discussions of value for money in the health sector and explicit priority-setting. For the HTA agency, it might be key to institutionalise the evidence use in the current policy-making process; however, this case reminds us of the underlying interface between evidence supply and decision-making, which requires for a concrete construct of knowledge platform and legally, morally, and equitably accepted notion of "evidence".

Key Words: HTA; national essential public health package; multi-criteria decision analysis (MCDA); evidence matrix; policy-making process

The Chinese health system is facing the great challenge of efficiently allocating its limited resources to achieve universal health coverage for the world's largest population. Radical health reforms launched in 2009 have expanded to cover essential healthcare services and provide more financial protection for the poor and vulnerable. Massive new funding has enabled implementation of public health programs and other major health system changes. The total national health accounts have more than tripled, from 256.80 billion USD in 2009 to 779.03 billion USD in 2017. The increase in total health expenditures has far exceeded even the robust GDP growth during these years.

With domestic and global economic slow-down, the Chinese government has

begun to consider ways of reducing waste and reallocating resources. The financing has been further devolved, which has caused problems for equal provision of public service, including public health services.

This paper takes a case study approach to analyze the recent effort of adjusting the national package of essential public health services, the single largest public health program funded by the public sector in the country. It attempts to examine the explicit priority-setting framework adapted from the Chinese HTA process and informed by multi-criteria decision analysis (MCDA). The changing role of researchers in the decision-making process is analyzed as well, revealing insights from the efforts to support disinvestment decisions.

3.3.1 National Program on Essential Public Health Services (EPHS)

EPHS and its adjustment

Since 2009, to achieve the goal of universal health coverage (UHC) and a “Healthy China” (Meng et al. 2019), the Chinese government has invested the equivalent of billions of USD toward establishing a national program on universal and equal provision of essential public health services (Yuan et al. 2019). The national program, known as the essential public health services (EPHS) (Yang et al. 2016) is to equally provide all with access to a defined minimum public health package through per capita allocation of national and subnational subsidies (Yuan et al. 2019). The initial EPHS package has nine categories of services (35 items), including health records creation for every resident, health education, immunization, chronic disease (only hypertension and diabetes) management, severe mental illness management, maternal and child health care services, elderly health care, and so forth (Ding et al. 2013 , Li et al. 2016).

In the past 10 years, the per capita annual funding of EPHS has increased

from 15 Yuan (2.23 USD) in 2009 to 50 Yuan (7.44 USD) in 2017 (Yuan et al., 2019), and the package has expanded to cover 14 categories (55 items) (Table 3 - 6). The total accumulated fund for EPHS is 376.8 billion Yuan RMB (56.1 billion UDS) in 2017, with an average annual increase by 17.6%. Primary healthcare facilities are responsible for delivering these services for free to all local citizens.

Table 3 - 6 EPHS package in 2018

Category	Target population	Service items
Health records	Residents in the jurisdiction (non-registered residents with over 6 months stay included)	1. Building the health record; 2. Record keeping
Health education	Residents in the jurisdiction	1.providing health education material; 2.publicizing education content; 3.health consultancy; 4.lecturing on health knowledge; 5. delivering personalized health education
Immunization	Children (0-6) and other key groups in the jurisdiction	1.immunization management; 2.inoculation; 3. adverse reaction handling
Child care	Children (0-6) in the jurisdiction	1.home visit to neonates; 2. Health check for 1-month babies; 3. Health check for infants and young children; 4. Health check for pre-school children.
Maternal care	Pregnant women in the jurisdiction	1.early pregnancy care; 2. middle-stage maternal care; 3. perinatal care; 4. postpartum visit; 5. postpartum check at day 42
Elderly care	residents (≥65) in the jurisdiction	1.assessment of lifestyle and health status; 2. physical check; 3. auxiliary examination; 4.health mentoring
NCDs care	residents with primary hypertension and type 2 diabetes (≥35) in the jurisdiction	1.health check; 2. follow-up and targeted interventions; 3.health check
Care for severe mental illness	Residents with diagnosed mental	1.patient record keeping; 2. follow-up assessment and targeted intervention; 3. health check
TB care	TB patients in the jurisdiction	1.screening and referral; 2. household visit; 3.supervised medication taking and follow-up; 4. case closure

		assessment
Traditional Chinese medicine (TCM) care	The elderly (≥65) and children (0~36 months)	1. TCM constitution identification in physical examination of the elderly; 2.TCM-based child care
Reporting and handling of infectious disease and public emergency		1.risk management of epidemic and public emergency; 2. detection and indexing of epidemic and public emergency; 3. case reporting; 4. handling of the case
Inspection and supervision	Residents in the jurisdiction	1.reporting of food-borne disease; 2. water hygiene inspection; 3. school hygiene service; 4. reporting of illegal medical practice and illegal blood collection and supply; 5. reporting of family planning information
Free contraceptives		1.Provincial health authorities are in charge of procurement of contraceptives; 2. county, city and provincial family planning and contraceptives management agencies are in charge of storing and allocating of the contraceptives
Health promotion		1. building health promotion county (district); 2. health education; 3. health promotion hospital and smoking cessation clinics; 4. health knowledge and smoking surveillance; 5.12320 health consulting hotline; 6. health education for priority contents, key diseases, and main population groups

As one of the 5 main components of the health system reform for achieving UHC, the program has greatly increased coverage of essential care and reduced access and health status disparities between areas of lower and higher economic development (WHO, IBRD, WB 2017). However, uneven care quality, service utilization, and outcomes are reported (Ding et al. 2013, Li et al. 2016), and varied progress made in different localities (Yuan et al. 2019). Primary health workers are overloaded and stretched to provide the minimum services (Zhou et al. 2015), especially in rural and remote areas where the lack of primary health workers has been a longstanding issue (Meng et al. 2019).

Rationale for EPHS disinvestment

With the devolving of public financing (State Council 2018), the NHC has been asked to reallocate funds for the public health programs and improve allocation efficiency. Against this background, the NHC has taken the lead in adjusting and reallocating the EPHS funds, to identify and move less effective

or less cost-effective services out of the national package to release resource for inclusion of other, more effective or cost-effective services in future.

From the perspective of the healthcare provision, NHC decided to work out a regular mechanism of adjusting the national service package, delist ineffective services, and allocate resource for new services. It commissioned researchers in the newly established HTA agency—the National Center for Medicine and Health Technology Assessment (NCMHTA) to conduct a research on disinvestment mechanism.

Section 2 will review the priority setting methods in use in and out-side China, and propose a framework of examining such efforts in a specific country context, such as China. Section 3 will analyze the case of disinvestment decision-making process of EPHS and examine it with the framework developed in the section 2. Section 4 will discuss about the learning from such a process and draw conclusions on future considerations in doing such research.

3.3.2 Constructing a conceptual framework for the EPHS disinvestment decision

Conceptualizing disinvestment as a deliberative process

The lack of uniform methodological framework for disinvestment decision is noted in the literature, in addition to lack of policy mechanism and other political and social challenges (Elshaug et al. 2009). Program budgeting and marginal analysis (PBMA) (Ball et al. 2009) and health technology assessment (HTA) (MSAC 2011) are commonly used tools for disinvestment decisions.

A literature review of 14 case studies on disinvestment (Polisena et al. 2013)

identifies some common decision criteria, including: disease burden, clinical effectiveness and safety, opportunity cost and cost-effectiveness, healthcare services impact (ethical, legal and social), stakeholder and public engagement, sources of data, decision purpose and rationale, impact of decision, and strengths and limitations of frameworks and tools based on stakeholder feedbacks. It also finds some common issues in most case studies, such as establishing basis for decision-making, making decisions evidence-informed with costs and other types of local data, and ensuring a fair decision-making process. The data requirements of disinvestment and a framework for data collection are cited as the future direction for studying disinvestment practice. What is more, triggers of the disinvestment decision and barriers to proceeding in the decision process remain unclear.

In the area of public health, evidence-based public health has been promoted, as demonstrated by a series of national health strategies in many OECD countries. EPHS program was set up in such a background in 2009. However, not all the current services included in EPHS have an evidence base. Based on interviews with the designers of the program, the original 9 services were included partially on the basis of evidence search, and partially on the basis of political will and subjective estimation by policy-makers and their advisers. For the service added later on, such as free contraceptives and TCM management of the elderly and children under 3, it is more a result of policy lobbying of NHC departments or ministries than serious decision. In such a situation, it might be misleading to approach EPHS disinvestment from a naive positivist approach, such as evidence-based public health decision-making (Brownson et al. 1999)

More contemporary literature discusses about swiftly deploying information and other inputs besides evidence into the health decision-making process (Culyer and Lomas 2006; Greenhalgh and Russell 2009). Greenhalgh and Russell (2009) argue for a constructive approach to using rhetorical argumentation for a “fair” policymaking process. Decisions are considered as context-sensitive choices made through negotiation and deliberation in uncertainty (Eddy 1991; Fleck 2001; Davey et al. 2001). Such an

argumentation or deliberative process is especially necessary in addressing difficult moral questions like “how to prioritize and ration healthcare services” in complex health systems (Davey et al. 2001; Kipiriri & Martin 2007).

Baltussen and his colleagues has proposed an evidence-informed deliberative process for supporting priority setting in achieving UHC (Baltussen et al. 2016; Laurer et al., 2017). EPHS disinvestment is a difficult problem to address, and a deliberative process is required to combine evidence with other types of inputs for designing and building an explicit priority-setting process for driving the decision.

Building an explicit priority-setting process

Scarcity of health resources creates problems for all health systems. In pursuit of better value in health, most countries are grappling with decisions about how to select the most cost-effective interventions, provide the most needed care, and reduce waste in the health sector. In some nations, explicit healthcare rationing and priority-setting approaches have been adopted to make such decisions (Klein 1993; Ham 1997; 184. Vuorenkoski, Toiviainen & Hemminki 2008).

Explicit priority-setting has been increasingly discussed in literature, reflecting a trend of pursuing evidence-informed and transparent decision processes. With the rise of comprehensive evidence-based processes such as HTA, many countries have adopted such evidence synthesis approaches, incorporating clinical, economic and ethical considerations into health decisions. Such priority-setting practices are often based on available evidence and other relevant data, informed by views of various key stakeholders and operating in a specific decision context. As a result, different countries may have different choices of specific priority-setting decision models and processes (Sabik and Lie 2008).

Key criteria for evaluating priority-setting efforts in different countries are proposed by Sabik and Lie (2008), namely, adequate public input and discussion, appropriate principles, and impact on policy and practice. In

practice, rationing and priority-setting usually encounter many barriers (Klein and Williams, 2000), and country experiences varied in terms of the impact on policy and practice (Sabik and Lie 2008).

Based on previous studies of successful efforts such as the National Institute of Health and Care Excellence (NICE) in the UK, some notable facilitative factors for priority-setting in health include: 1) a public priority-setting body to convene or organize the process; 2) independence of the expert panel in making decisions or recommendations; 3) pre-defined decision criteria or process for obtaining recommendations; 4) engagement of the public in the deliberation process; 5) ability to take appeals from key stakeholders such as private sector partners and the public (Sabik and Lie 2008).

In the context of China, policymakers are not used to the explicit priority-setting practice. Central and local decision-makers used to decide on resource allocation plans in the office with the official adviser whom they fully trust. Things have changed since 12th Five-Year Plan period (2011-2016), and with formal learning and evaluative thinking embedded in the decision-making process (Xiao et al. 2017; Xiao et al. 2018). The protracted and incremental decision-making process in China is noted for being iterative and refining through a continuous cycle of experimenting, learning, and modification (Lieberthal & Oksenberg 1988; Liu & Bloom 2009). However, such decision-making style has typical requirement for timing and spaces, differing from the concentrated and open discourse on priority-setting.

For the first time, the national decision-makers are seriously considering about developing a formal priority-setting mechanism for updating EPHS. In a context unfamiliar with such open and explicit discussion about resource allocation and service planning, the idea of developing an explicit priority-setting process is a bold undertaking.

After several consultation meetings with the EPHS designers, program managers and implementers, and experts in related fields, a formal disinvestment process has been proposed by the author and her team.

EPHS disinvestment is complex and multifaceted, involving multiple stakeholders and dealing with different decision criteria simultaneously. Multi-criteria decision analysis (MCDA) (Baltussen et al. 2005; Baltussen et al. 2006; Wilson et al. 2006) is considered as a suitable decision analysis tool. MCDA combines disease burden, evidence-based medicine, cost-effectiveness, and other social, economic and political considerations together (IJzerman et al. 2014; Marsh et al. 2017). A fair and transparent deliberative decision-making process with the support of key evidence and other necessary inputs is considered as crucial for driving the tough disinvestment decision.

3.3.3 Design of the EPHS adjustment assessment

The researchers position themselves as the evidence supplier and facilitator of the disinvestment process. Based on ISPOR's 8-step approach, a 6-step process was proposed (Figure 3 - 6). Based on the stakeholder analysis, 4 groups of stakeholders were identified, namely decision-makers, researchers, managers and providers, and public.

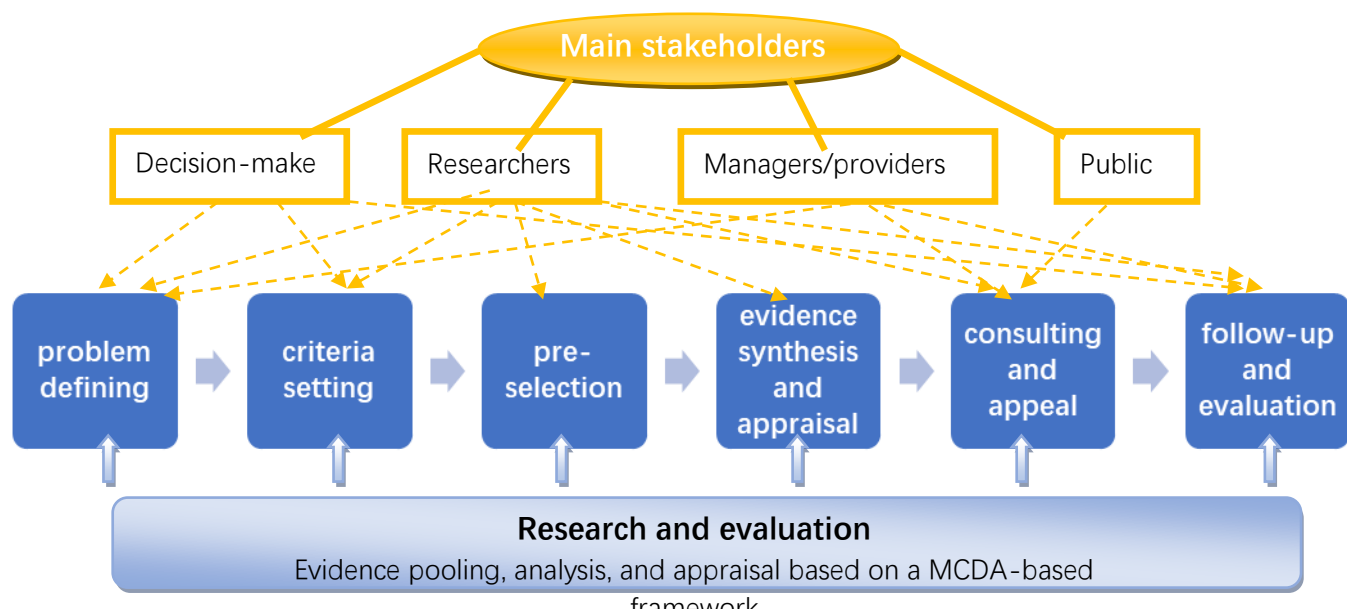


Figure 3 - 6 Overall research design

Based on the research design, a methodological framework is proposed (Figure 3 - 7) and detailed methods proposed (Figure 3 - 8). The following 6-stage priority-setting process is planned and executed.

1. Problem defining

Literature and document reviews are conducted to understand EPHS, including its program structure, implementation progress, program outcome and impact, and main issues and challenges. Three focus group discussions (2 with the decision-makers in the Department of Primary Health (DPH), and 1 with national policy experts) and interviews of 17 key informants are conducted to collect information of the decision problems and rationale for adjustment. Based on the information collected, the decision problem is defined and confirmed, and initial criteria selected.

2. Criteria setting

Pre-selected criteria based on literature review and policy study are formally reviewed and openly discussed by main stakeholders identified. The structured table of criteria, dimensions and considerations is set up as the main tool for eliciting stakeholders' opinions.

3. Pre-selection

Pre-selection of the subject service(s) is conducted using the structured criteria and facilitated by the research team. EPHS adjustment priority range and scores are obtained through questionnaire survey of key stakeholders.

4. Collection of supplement evidence

Additional implementation data are obtained in the selected 6 provinces by conducting questionnaire survey on service utilization and satisfaction of citizens and patients. Systematic evidence collection, synthesis and appraisal is conducted for each of the 14 services. The selection criteria are used as a framework for evidence collection. Evidence is appraised in terms of quantity and quality by a self-developed scoring standard. The per capita cost of EPHS is estimated for each service by conducting survey of the sampled primary

health facilities.

5. Consultation and appeal

Expert consultation is conducted, and final recommendations formed. A technical report and a policy recommendation report are submitted to the NHC. A high-level consultation conference is held by the Department of Primary Health.

6. Follow-up and evaluation

As planned in the research proposal, follow-up with the implementation and evaluation of implementation in real settings will be conducted with the support of NHC.

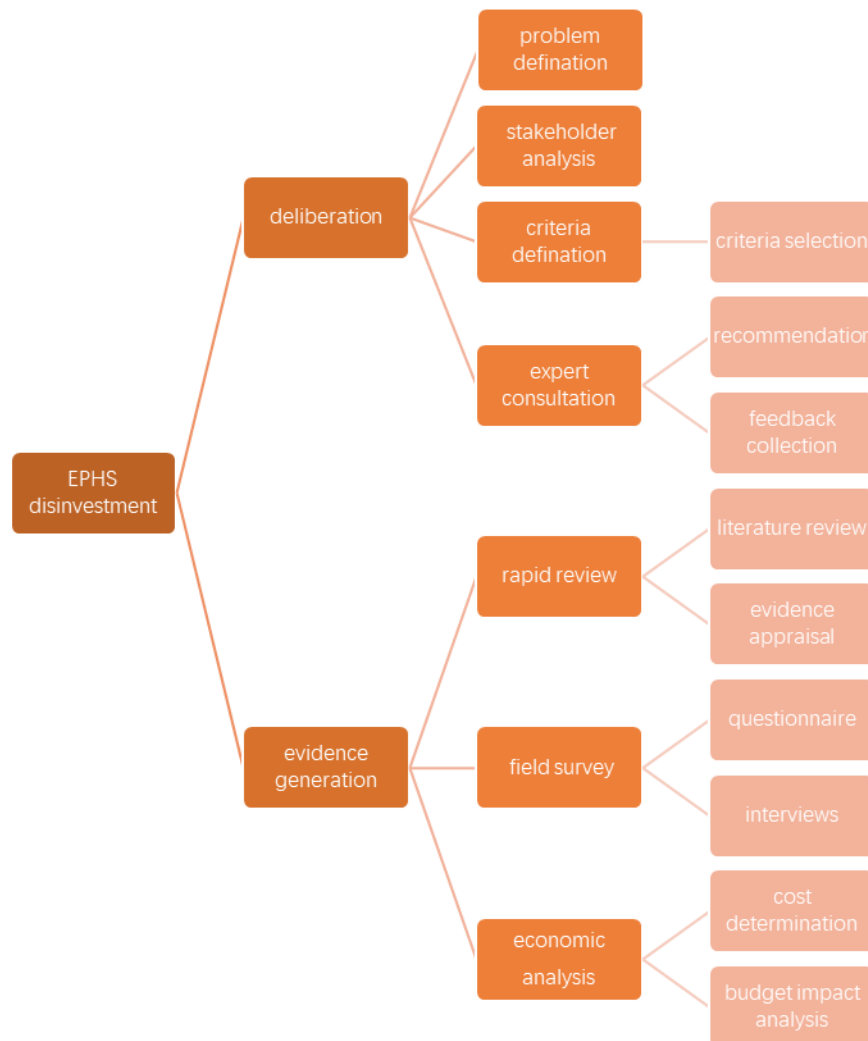


Figure 3 - 7 A framework for data collection

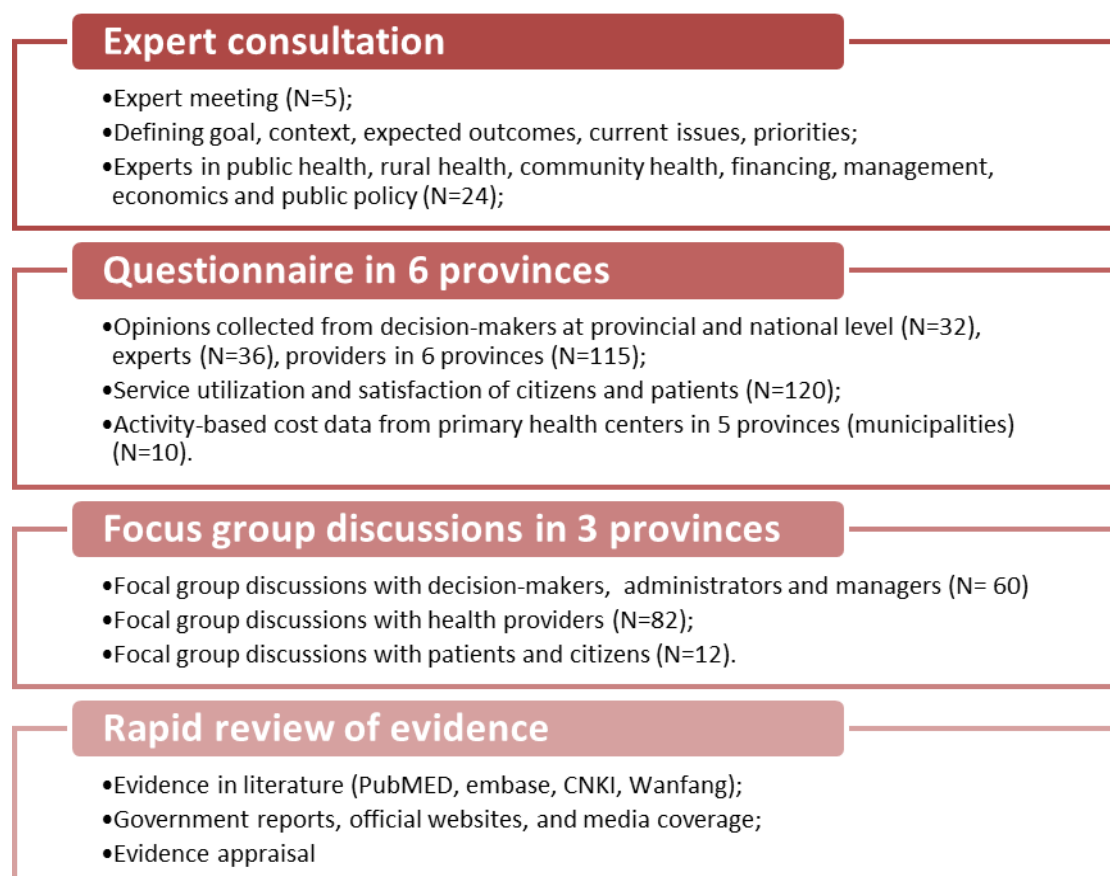


Figure 3 - 8 Main data collection methods

3.3.4 Findings

Varied altitudes and interests of the key stakeholders

Four main stakeholder groups are identified in the stakeholder analysis, namely, decision-makers, experts and academics, implementers, and service users. These stakeholder groups are not made of homogenous individuals, but organizations with various stands and missions. They have varied power, altitudes and expectations of the national policy on EPHS adjustment (Table 3 - 7). The biggest disputes are found among the decision makers. Even in the same agency—the National Health Commission, different departments are holding different views and expectations. Substantial divergence of opinions caused difficulty in reaching consensus on the purpose of adjustment and relevant decision-making criteria.

Table 3 - 7 The stakeholder analysis of EPHS adjustment policy-making process

Stakeholder	Power	Role	Attitude	Expectation
Ministry of Finance	Very High	Decision-maker (initiator of change)	Supportive	Collapse the ear-marked funds for major public health programs with the EPHS funds, improve efficiency and accountability
National Bureau of Traditional Chinese Medicine	Medium	Decision-maker (participant of change)	Oppose	No change to the TCM care
National Health Commission	High	Decision-maker (change maker)	Mixed	Increase funds without adding more service
Minister	High	Decision-maker (initiator of change)	Supportive	release funds for subsidizing more NCD care
Dept. of Primary Health	High	Supervisor and Implementer of EPHS Program	Supportive	Reduce workload of primary taskforces, remove ineffective services, avoid overlaps with other departments or ministries
Dept. of Health Finance	Very high	Budget holder (reform adopter)	Supportive	Increase funds without adding more service, revise budget based on actual costing results, increase financial accountability
Bureau of Disease Control and Prevention	High	Decision-maker (participant)	By-stander	Remain the same or add more services
Dept. of Maternal and Child Health	Low	Decision-maker (participant)	By-stander	Remain the same or add more services
Fund Inspection Center	Medium	Implementer (program manager)	Supportive	Improve program performance, increase accountability of local governments
Bureau of Supervision and Inspection	Medium	Decision-maker (participant)	Oppose	Remain the same
CNHDR	High	Recognized think-tank	Neutral	Explore reliable methodology for priority-setting, deliver

		(researchers)		knowledge needed by decision-making
Center for Women and Children Research, China CDC	Medium	Recognized think-tank (advisor)	Neutral	Understand the change, identify potential research topics
Center for Financing Research, Ministry of Finance	Medium	Recognized think-tank (advisor)	Neutral	Understand the change, identify potential research topics
University-based faculties	Low	Academics (advisors)	Neutral	Understand the change, identify potential research topics
Local/national community healthcare associations	Medium	Professional societies (advisors)	Supportive	Understand the change, identify potential research topics
Local health authorities	High	Local decision-makers (implementers)	Supportive	Save resources, spare troubles, improve program performance and accountability
Local governments	Very high	Local decision-makers (funders, policy-makers)	Supportive	Improve public satisfaction, save resources, improve fund using and accountability
Other local non-health government agencies	Medium	Local decision-makers (participants)	Mixed	Avoid troubles, spare efforts, improve service delivery and performance
Target service users	Low	Recipients	Supportive	Increase choices, expand access, improve quality
Members of the community	Low	Recipients	Supportive	Increase services, improve quality

Decision criteria

After 3 rounds of meetings with the DPH officials and their main advisors, the research team define the purpose of adjustment decision, namely, to identify

and select the ineffective, inefficient or unacceptable services for delisting and disinvestment decision. Based on policy analysis and literature reviews, initial criteria, dimensions and possible considerations for selecting the priority intervention(s) are proposed and discussed through meetings with the DPH officials, local policy makers, and researchers and experts recommended by the DPH. Such a framework (Table 3 - 8) offers a starting point for further deliberation and analysis. The decision criteria are presented in 5 dimensions, namely, health needs, program design, effect, economic impact, service delivery capacity, and social impact. Specific considerations have been listed under each dimension, to better assist understanding and decision-making.

Table 3 - 8 The decision criteria and main considerations

Criteria	Considerations
Health needs	Cannot meet the current population health need
	Target population size is not large
Program design	Unclear or wrong definition of the target population
	Poorly defined intervention
	Unclear delivery pathway or poorly distributed workload among the providers
Effect	Undefined effect or ineffectiveness
	Irrelevance to population health outcomes
Economic impact	High costs
	Unclear or poor cost-effectiveness/benefit
Service delivery capacity	Understaffed delivery
	Low competence
	Lack of supervision by professional public health facilities
Social impact	Low acceptance by the community people
	Low acceptance by the community health providers

Adjustment of priorities

Three groups of stakeholders, i.e., decision-makers, managers and providers, and experts were approached for ranking the 14 categories of interventions based on the predefined decision criteria (Table 3 - 8). A scoring method has been developed and provided for the stakeholders to score the probability of adjustment of EPHS interventions. Weights have been given to 3 groups of

stakeholders based on their numbers and importance in making the decision. Patients and their families were not asked to rank these, for they may be unfamiliar with the majority of services in the package. The providers were considered as being representing the population they serve.

The priority ranking varied among the three groups of decision-makers (Table 3 - 9), with the biggest differences about certain interventions arising among the decision-makers and local implementers of EPHS. Decision-makers generally took similar views of the order of adjustment, with similar rationales. The disputed views between decision-makers and implementers reflected the that there are gaps in the development of policy and its actual implementation. For instance, health promotion has been stressed in Healthy China 2030 Plan as a key measure for population-level health campaigns and introduced into EPHS in 2016; however, the national and local health decision-makers and implementers considered it being overlapping with the existing intervention of health education. As they participated in the design and development of the national program, the researchers, who are mostly policy advisors, tended to share similar views with the decision-makers. This reminds us of the “path-dependence” in decision-making and policy implementation process.

Some interventions subject to the largest variations in views included free contraceptives, infectious disease management, NCD management, and supervision and inspections (Table 3 - 10). The interviews and discussions revealed that primary health decision-makers and health providers tend to consider adjustment necessities and priorities from different angles. For instance, free contraceptive distribution does not require much effort from the provider’s side, but requires management by the decision-makers. NCD management, is the focus of current health reforms and attracts considerable policy attention. However, while the local providers reported that implementation of NCD management is demanding, its effect is not commensurate with the great level of effort.

Table 3 - 9 Adjustment priorities suggested by the stakeholder groups

No.	Decision-makers (N=32)	Managers and providers (N=115)	Researchers and experts (N=36)
1	Supervision/inspection	TCM care	Free contraceptives
2	Free contraceptives	Health promotion	Supervision/inspection
3	TCM care	Severe mental illness case management	Health promotion
4	Infectious disease and emergencies	Elderly care	TCM care
5	Severe mental illness case management	NCDs management	Severe mental illness case management
6	Health promotion	Supervision/inspection	Infectious disease and emergencies
7	TB case management	Health education	TB case management
8	Maternal care	Maternal care	Health education
9	Health education	Health records	Health records
10	Health records	Child care	Elderly care
11	Child care	TB case management	Maternal care
12	Elderly care	Free contraceptives	Child care
13	NCD management	Immunization	NCDs management
14	Immunization	Infectious disease and emergencies	Immunization

Table 3 - 10 Adjustment priority range

14 services in EPHS	Ranking range													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Supervision and inspection														
Health promotion														
mental illness management														
Free contraceptives														
TCM care														
Infectious disease management														
Health education														
TB case management														

Elderly care														
Maternal care														
Health record														
NCDs management														
Immunization														

The research team calculated the priority scores given by the three groups of stakeholders. Based on the relative number of respondents to the questionnaire on adjustment priority, the decision-makers, experts and implementers have a ratio of 1:1:3. This ratio was used to weight the scoring, reflecting that the implementers (i.e., managers and providers) are closest to, and more likely to influence, implementation and relevant issues. The score for each intervention is calculated, with the highest score representing the highest priority for adjustment decision (Table 3 - 11).

Table 3 - 11 Scoring of the adjustment priority

No. Service	Score
1 Supervision and inspection	8.57
2 Health promotion	8.10
3 Case management of patients with severe mental illness	7.62
4 Free contraceptives	7.14
5 TCM care for the elderly and children	6.19
6 Case management of infectious disease and emergencies	5.00
7 Health education	5.00
8 TB case management	4.76
9 Elderly care	4.52
10 Maternal care	4.29
11 Health record	4.05
12 NCDs management (hypertension and diabetes)	3.33
13 Care for the under 6 children	2.86
14 Immunization	0.95

Evidence synthesis and appraisal

The research team prepared the evidence synthesis in order to support the experts in making final recommendations. They selected and reviewed 225 peer-reviewed published Chinese papers, and other grey literature and study reports using the search terms of each service in the EPHS package plus the key words appeared in the decision criteria, such as health need, effectiveness, and cost-effectiveness (Figure 3 - 9), and graded the quantity and quality of evidence for each EPHS service based on a 5-point scoring tool developed on the basis of the Cochrane Collaboration tool for grading observational studies (Table 3 - 12). Four services were identified as weakly recommended for remaining in EPHS.

Quantity of evidence was judged by 6 criteria: 1) national study scores 5; 2) provincial study (covering 3 or more provinces) scores 4; 3) provincial study (covering less than 3 provinces) scores 3; 4) prefecture, city or city district (covering 3 or more places) scores 2; 5) prefecture, city or city district (covering 3 or more places) scores 1; 6) no relevant study scores 0. Quality of evidence was judged by 4 criteria: 1) guidance or expert consensus scores 3; 2) data from multi-staged survey score 2; 3) data from typical survey score 1; 4) no survey data scores 0. The recommendation for each intervention has been made by the following 3 criteria: 1) strongly recommend: adequate evidence (quantity scores 3 or more), and good quality (quality scores 2 or more); 2) recommended: adequate evidence (quantity scores 3 or more), or good quality (quality scores 2 or more); 3) weakly recommended: inadequate evidence (quantity scores less than 3), and poor quality (quality scores less than 2).

The same structure of decision criteria was used for the evidence review results.

A limited number of experts (N=5) representing different areas of work (maternal and child health, primary health, NCD management, health

management, and health reform and development) are invited to appraise the evidence and make the final recommendations for disinvestment in those areas.

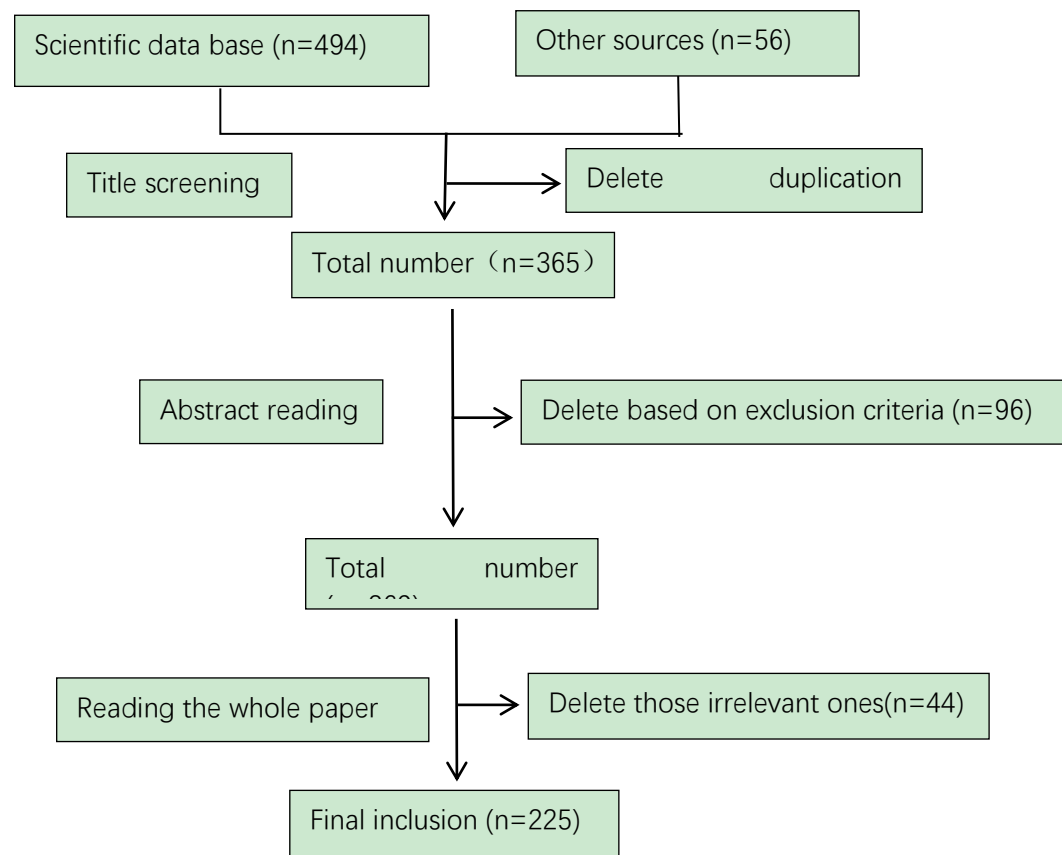


Figure 3 - 9 Literature selection and inclusion

Table 3 - 12 The evidence appraisal result

Interventions	Evidence Quantity	Evidence quality	Recommendation
Free contraceptives	1.3	1.4	Weakly recommended
Inspection and supervision	3.0	1.8	Recommended
Health education	3.0	1.4	Recommended
TCM care	2.4	1.1	Weakly recommended
Case management of severe mental illness	4.1	2.1	Strongly recommended
TB case management	2.4	1.8	Weakly recommended

Reporting/handling of infectious disease & emergency	2.4	1.8	Weakly recommended
Health promotion	3.5	2.1	Strongly recommended
Elderly care	3.0	1.7	Recommended
Health record	3.1	1.8	Recommended
Child care	3.5	2.3	Strongly recommended
Maternal care	3.4	2.1	Strongly recommended
NCDs care (hypertension and type 2 diabetes)	3.6	2.3	Strongly recommended
Immunization	3.9	1.9	Recommended

Cost and budget impact analysis

Cost and budget impact analyses were conducted based on the survey in 10 rural and urban primary health facilities in 5 provinces, representing the western, central and eastern regions. Per capita cost of each service is calculated, and regional variations are shown in Table 2-15. Large gaps between rural and urban facilities are observed. The total per capita cost of delivering the EPHS package in the western region is the highest (90.10~102.82 Yuan), while that in the central region is the lowest (49.43~50.84 Yuan). On average, the actual per capita total cost of EPHS was 75.70 Yuan in 2017, 50% higher than the per capita budget (50 Yuan). Therefore, the current budget cannot cover the actual cost, especially in the western region, where the indirect cost of service delivery is much higher than other regions due to access issues (Table 3 - 13).

The per capita cost of delivering NCD case management is the most costly (15.64~26.25 Yuan), while reporting and management of infectious disease is the least costly (0.09~0.79 Yuan) (Figure 3 - 10).

Table 3 - 13 Costing results

Essential public health services	Per patient costs (Yuan RMB)					
	Rural primary health facilities			Urban primary health facilities		
	Eastern	Central	Western	Eastern	Central	Western
Health records	11.97	7.74	18.37	16.45	9.08	12.20
Health education	4.63	3.66	2.41	18.98	0.95	4.61
Immunization	4.46	3.51	5.13	2.82	2.21	38.97
Under 6 child care	6.10	5.07	27.91	5.57	4.98	15.74
Maternal care	4.36	2.93	3.23	3.80	2.40	2.33
Elderly care	7.49	6.17	7.82	8.93	7.69	8.50
Case management of hypertensive patients	15.26	12.08	16.26	20.10	14.97	13.06
Case management of type 2 dietetic patients	4.85	3.56	4.26	6.15	4.57	4.78
Case management of patients with severe mental illness	2.53	2.30	2.11	3.16	2.25	1.01
TCM care for the elderly and children	1.56	1.30	1.18	1.94	1.27	0.57
Reporting and management of infectious diseases and emergencies	0.79	0.57	0.15	0.26	0.16	0.09
Supervision and inspection	1.06	0.83	1.50	0.30	0.67	0.83
Total per capita costs	64.99	49.43	90.10	96.02	50.84	102.82

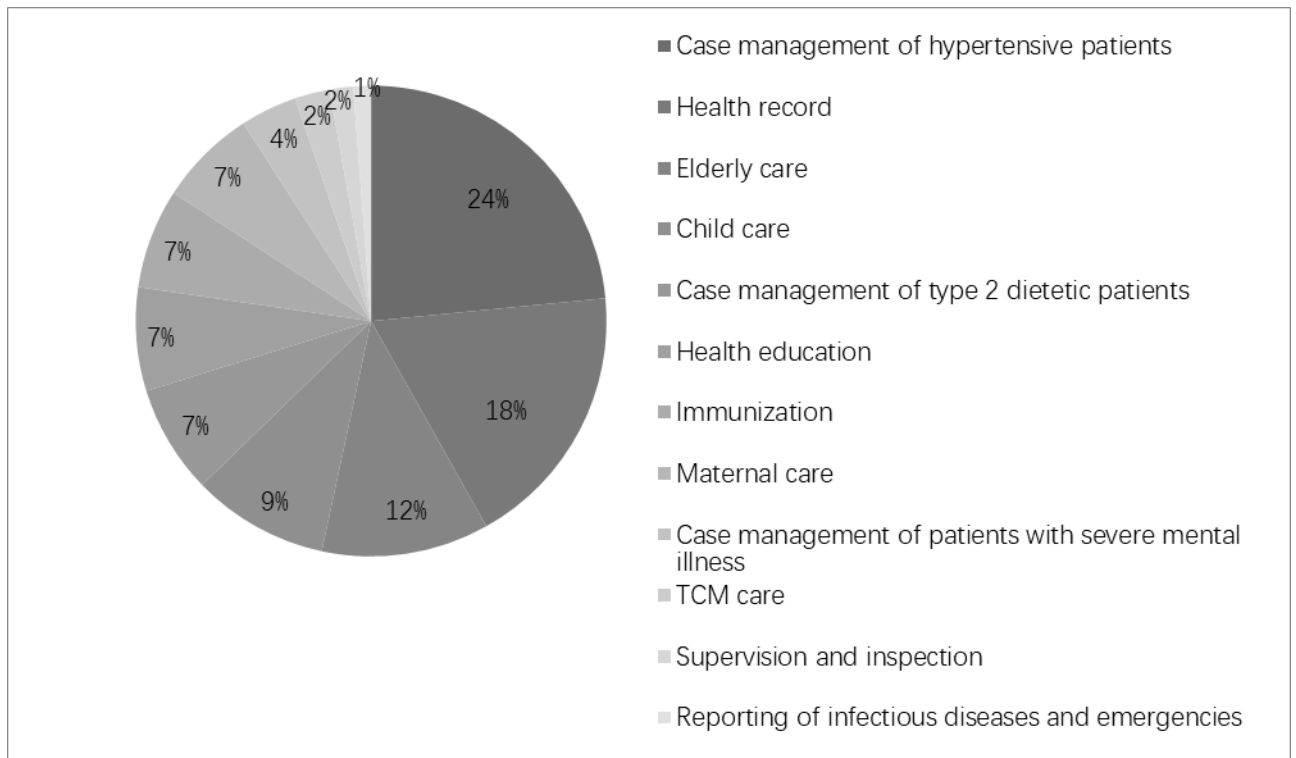


Figure 3 - 10 Composition of per capita cost of EPHS package

Key stakeholders' feedbacks

Interviews and focus group discussions were conducted in the sampled sites to collect opinions from the local health decision-makers, health managers, primary care providers, and patients. Three sites were identified: Huzhou City of Zhejiang Province in the east, Changsha County of Hunan Province in the center, and Jiulongpo District of Chongqing Municipality in the west.

Local health decision-makers expressed concern about performance management and lack of focus of some services. Providers reported heavy workloads and lack of staff. Local service users reported unavailability of anti-hypertensive and diabetes drugs, and financial burden of NCD drugs. Providers and patients desired more medical service to be provided, such as NCD medication and lung function testing.

Final consultation was done to appraise all evidence review results and other inputs. Five experts were invited by the research team to a half-day meeting

and discussions of all the inputs and findings. Two officials (the Division Chief of the EPHS and his subordinate) from the DPH of NHC presided over the discussions. Feedback on the final conclusions and recommendations were also collected. Recommendations on disinvestment were finalized at the conclusion of the consultation (Table 3 - 14).

Table 3 - 14 Recommendations on disinvestment

Service nominated	Recommendation
Supervision and inspection	Delisting
Reporting and handling of infectious disease and emergencies	Delisting
TCM care	Delisting or merging with other services
Case management of patients with severe mental illness	Optimizing

Recommendation and follow-ups

The final technical report and the policy abstract were submitted to the DPH of NHC. A formal NHC-wide consultation process was followed, with DPH issuing an official letter to all departments for consultation. The TCM Bureau was also consulted. Comments and other feedback on the technical reports and final recommendations were collected and tabulated by DPH. CNHDRC researchers were asked to review and respond to the comments and other feedback.

An open consultation meeting was held by DPH, including presentation of the research findings and recommendations by the first author. Doubts about the rigor of the data collection tools were voiced by the TCM Bureau and two key departments: the Department of Supervision and Inspection and the Bureau of Disease Control and Management, which objected strongly to the recommendations for disinvestments from their departments. Their main argument was the contradictory findings of researches done by the HTA agency and other research departments of its mother institution—CNHDRC. Without considering the fundamental differences in terms of decision of concern, research goal, and methodology, they refused to accept the

recommendations and the systematic evidence matrix attached.

Due to the concerned departments' fierce resistance to change, NHC decided to withdraw the proposed disinvestment for the time being.

3.3.5 Discussions

The attempt to develop an explicit priority-setting mechanism for EPHS is the first of its kind in the country. This is a novel experiment for the evolving Chinese health care system. The researchers in CNHDRC designed an open process to facilitate the disinvestment decision and systematically collect the appropriate evidence and other relevant information for policy-makers.

However, in retrospect, the design of the explicit priority-setting process and accompanying evidence and knowledge generation plan were inadequate for informing disinvestment decisions in the current environment for the following reasons:

Firstly, the current decision-making system for EPHS is apparently not ready to accommodate the explicit priority-setting process designed by the researchers. Of great significance is that there is no legislative mandate for the HTA agency to inform the priority-setting of EPHS, though the HTA agency is commissioned by one of the main decision-making departments to conduct this priority setting research. Further, competition over authority and deep-rooted interests of departments and ministries made it difficult to reach consensus on decision criteria and interpretation of evidence.

Secondly, based on the feedbacks of some relevant department personnel, the researchers may have overstepped their responsibilities by initiating and organising the decision-making process, and making specific recommendations for disinvestment, esp. when the recommendations are directly used by the DPH as the policy proposal for open consultation.

However, since this is just a pilot project on the explicit priority-setting, the HTA agency fulfills the role anticipated by itself. If the formal EPHS policy

making mechanism will embrace such a change is still a question for further discussion and research. From the resistance of relevant departments, the HTA agency realises that the institutional arrangement for systematic evidence pooling, synthesis and use in the Chinese healthcare policy is key to the success of such explicit priority-setting process. With maturation of the Chinese HTA system and wider acceptance of comprehensive and active evidence generation and supply, such a situation will get improved. More importantly, it is the legislative role of the HTA agency in explicit priority-setting of such a big national policy change.

Thirdly, the connotation of the term “evidence” in the Chinese policy language system also invites further thinking. It is not the term used in the evidence-based medicine, for the Chinese health decision-makers have habitually used extensive tactic and experiential knowledge (consultation and piloting). It is the question of “whose knowledge for whom for what purpose”. The other departments or ministries all commissioned different research projects, including evaluation studies. When facing contradictory evidence supplied by different knowledge holders (even different CNHDRC research departments), the decision-maker may doubt the rigor of the current research, and use it as an excuse for resisting the policy change. Defining evidence in the Chinese policy making process is related to the second point. Once the existing knowledge platform, such as CNHDRC assumes its legal role in conducting HTA and MCDA and supplying evidence, what evidence is will be more concrete and tangible to the stakeholders.

Fourthly, the absence of a thorough, transparent, and well-accepted methodology for priority-setting and disinvestment in the country might be the main issue to emerge from this effort. For truly nationwide changes in health care benefits, it is important to optimize participation by relevant decision-making bodies and gain views of other key stakeholders, including but not limited to private primary care providers and non-service users. At the heart of this, the HTA agency should support to develop such a methodology and help bridge gaps of ministerial understandings of priority-setting, and reach consensus on the decision criteria and legal process. A process guide

of such priority-setting approach may be more helpful in the Chinese situation, where multiple ministries and departments engage in the health decision-making and many of them have their own ways of decision-making and varying degree of evidence use.

Beyond the resistance to the particular disinvestment recommendations arising from this initial process, designing an explicit priority-setting process is a milestone for the HTA agency as well as for the Chinese HTA system. It represents a concerted, organized attempt to pool multiple values in reaching important resource allocation decisions, of opening up the often-opaque process of decision-making, and of systematic consideration and appraisal of evidence in designing essential healthcare services.

The researchers have gained a better understanding of the difficulty of informing disinvestment and other resource allocation decisions, and appreciated the various sources of knowledge input, such as the views of the EPHS program designer, implementer, provider and public. Building on this important, original experience, practitioners in a newly established HTA agency are better prepared to refine and conduct further projects of this kind to in response to more requests from the central decision-maker.

3.3.6 Conclusions

The approach reported here for informing EPHS disinvestment decisions represents a meaningful experiment for the HTA agency in China. It planned and conducted an initial, pilot process for supplying systematically collected evidence and related evidence to enable more informed disinvestment decisions.

The HTA practitioners made a bold attempt of supplying systematic evidence for the major change of an important national public health policy. Even by using tools like HTA and MCDA and organising open discussions of values and evidence, the attempt suffered setbacks in reality in a country unfamiliar with open discussions of value for money in the health sector and explicit

priority-setting.

For the HTA agency, it might be key to institutionalise the evidence use in the current policy-making process; however, this case reminds us of the underlining interface between evidence supply and decision-making, at the heart of which there should be a concrete construct of knowledge platform and legally, morally, and equitably accepted notion of “evidence”.

This attempt generated major lessons for developing and continuing to evolve a systematic, explicit priority-setting process in China. Further study needs to be conducted by the Chinese HTA agency to improve the quality and utility of its role in facilitating such decisions.

Chapter 4: Methods and tools of the meta

learning in policy

Building on the previous two chapters, this chapter tries to answer the question: what methods and tools are useful for the meta-learning of the Chinese health policy making? Four case studies are included in the chapter. The first one is about health technology assessment (HTA) system, while the other three present the same topic—priority setting of maternal and child health service. The four cases discuss about the methodological exploration done by the key national health thinktank—CNHDRC, and show that contextualising methods and tools is important and that sustaining policy learning requires for continuous improvement of learning ability.

In the first case study, China's latest efforts in developing HTA system and relevant tools are presented. In a fragmented and complex policy-making background, the government has decided to develop HTA system, which demonstrates its commitment in institutionlising system-wide learning mechanism. The CNHDRC hosts the national HTA center and develops methodological guidance on HTAs. As pointed out by President Xi (2007), addressing issues in China requires enhanced learning abilities. In the case of the rapid HTAs, it shows that any tools and methods need to be adopted and adapted in fitting into the particular policy problem and context. This confirms with the learning ideology held by the Chinese government, that learning is composed of theory learning, reflectivity, and reflective practice. Borrowing the methods and tools from the books and western scholars is far from enough. And more practice-oriented adaptation is key for enhancing utilisation and policy learning.

The other three cases share a common theme—priority setting methods and

tools in the area of maternal and child health. In achieving the UHC, the country needs to make careful resource allocation decisions, to meeting infinite health needs of its population. When designing and implementing rapid, concurrent reforms in radical socio-economic transitions, it could be even more difficult to learn and make wise resource investment plan. The central government and implementation units at various levels need to gain policy learning capabilities, to address these hard decisions. Therefore, a coherent and comprehensive meta-learning construct has to be developed to meet the whole-cycle policy learning at multiple levels and dimensions. The three interconnected cases are a perfect specimen for examining tools needed for the MCH policy learning at policy research, design, and implementation stage, and for facilitating individual, organisational, systemic learning.

The second case in the chapter is on research priority setting. The CNHDRC adapted the CHNRI method in prioritising research topics on maternal and child health service delivery in the high-burden western areas in China. The researchers employed situational analysis to gain understanding of the local contexts before defining their approach to localising the priority-setting method. The contextualised learning process supported the adoption and necessary adaptation, and contributed to successful delivery of the priority topics for the national government and international funder (UNICEF). The researchers conducted the situational analysis to understand the local reality. By collecting quantitative and qualitative data from the local counties, they identified gaps and issues with the local MCH care, and used that as a starting point for prioritising national MCH research agenda. In the process, besides the researchers, representatives of government agencies and UNICEF, experts consulted, and medical professionals and patients interviewed have learned about the tool as well as the priority-setting decision-making process. The key learning contents include academic literature, local context and health data, and key stakeholders' views. Both single-loop learning of the gaps of MCH research and double-loop learning of localisation of the priority-setting practice has been achieved.

In the third case, a one-health-tool (OHT) based cost-effectiveness analysis

(CEA) of the child care intervention was done to support the maternal and child health planning for the 13th Five Year period (2016-2020). As the national government is commencing to set up HTA system, use of CEA evidence is important for resource allocation and planning policy making. This case shows the localisation of the CEA tool in the particular policy context of 13th Five-Year Plan for Health. It is interesting to observe the peculiar organisation and delivery of the research process, as well as the presentation of research findings. This reflects the typical Chinese approach to tool adaptation and innovation—engaging policy actors such as experts and policy-makers, pool context-relevant data and information from various sources, and give realistic recommendations such as staged implementation. This case was regarded as a success, for the Department of Maternal and Child Health used the findings in supporting the child care planning and launched a pilot study targeting newborn health in 2017. Although, the case focuses on the tool development and presentation process, it indicates that the Chinese decision-maker is ready to use economic analysis for resource allocation decision. In the process, not only the decision-maker learned and changed the conventional decision-making process by adding new CEA evidence, the experts consulted, as well as key institutions active in the field of MCH care in China, such as the UNICEF and China CDC learned about the new tool and realised the role of CEA evidence for the resource planning decision. The meta-learning of the priority-setting of high impact interventions for child health was showed in organisation of the study process itself. To some extent, the process created a learning space for all the parties involved, and nurtured the adoption and adaption of the new tool. The policy translation of the final recommendations indicates the learning outcome of the meta-learning—acceptance of new evidence on the part of the central decision-maker, UNICEF, and the other technical partners like China CDC.

The fourth case presents a case of priority-setting of the newborn policy implementation. It is a continuation of the previous 2 cases, showing continuous efforts of exploring suitable methods and tools for gaining learning abilities in designing and implementing maternal and child health policy. This is a large-scale pilot program on essential newborn intervention

implementation in 20 poor rural counties in 4 western provinces. The national health authority experimented actual implementation of the high-impact interventions developed in the previous case. In the design stage, the CNHDRC researchers helped to design monitoring and evaluation (M&E) and conducted situational analysis and baseline of the M&E. The case documents how the national think-tank designs comprehensive approach for supporting priority-setting of local program implementation, with the ambition of enabling systematic learning. By the time of the thesis writing, the research findings have supported implementation planning in 18 counties in the 4 provinces, and 2 provinces decide to roll out the high impact interventions. A mid-term M&E is scheduled in the end of the year to examine impact of the program. The follow-on results show the promising learning results of the methodological learning itself. The pilot program is typical of its kind, with the central government issuing semi-open pilot policy with the support of technical partners like UNICEF and implementation units at subnational level (provincial, prefectural, county government, MCH facilities, and the like) designing detailed pilot plans. The technical partners including the CNHDRC were supposed to provide technical support for the locals to design a better implementation plan. The situational study was designed for the purpose of identifying potential knowledge gaps in local implementation and offering the needed evidence for local pilot planning. The thinktank was conscious of their lacking understanding of the local reality, and designed a comprehensive approach to situational analysis. They organised field visits, consultancy and training workshops, collection of local concerns and attitudes of the pilot, and open discussion of local implementation plans and evidence needs. These research activities offered opportunities for individual, organisation, and systemic learning. The thinktank assumed a role of learning facilitator and coordinator of key policy learning activities. The meta-learning of the methodologic approach was achieved. Apart from the learning capability gained by the thinktank, the national technical partners as well as subnational implementation units all collaborated in delivering the research activities, exchanged views and information, and contributed to the estimation and analysis results. The situational analysis linked the policy design and implementation process, served as learning process for all key actors, finally

offered the knowledge that is really needed by the local.

Put together, the four cases indicate the proactive method and tool development on the part of the national think-tank, and the unique approach of adapting existing methods and tools and of applying them in pragmatic ways.

4.1 Rapid HTA in China

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Abstract

Goal. To examine the current use of rapid health technology assessments (HTAs) in the specific decision-making context in China.

Method. This paper uses case study approach to analyze how the Chinese HTA practitioners have drawn on the rapid review method developed by the Ottawa Hospital Research Institute to develop a rapid HTA method that is suitable for use in the context of China.

Findings. Rapid HTAs were conducted by the national HTA agency in China for a variety of decision settings. These rapid HTAs in China have shared a similar analytical framework as full HTAs, but taken slightly different process, mainly due to limited time frame (2 week to 3 months). Rapid HTAs have become a possible source of knowledge for rapid decision-making in the country.

Conclusions. Even though actual use of rapid HTAs needs to adapt to specific contexts or decision purposes, a consistent procedure, pathway and reporting format has to be adopted to gain legitimacy in the decision-making process.

Key words: rapid HTAs; decision making; China

4.1.1 Rapid HTAs and its influence

In recent decade, rapid health technology assessments (HTAs) or rapid (evidence) reviews in HTAs have emerged as a new approach to synthesizing evidence for health technologies, to better meet emergent decision needs of health decision makers (Hailey, et al., 2000; Khuangura et al., 2012; Hailey, 2009; Goodman, 2012; Watt et al., 2008). Rapid HTAs are a type of assessment deployed in some countries, which are much shorter and less rigorous than “full HTAs”, but fuller and richer than quick notes, rapid responses, scope searches, or horizon scanning reports. Some authors use the terms “rapid HTA” and “rapid review” interchangeably, while others consider that rapid reviews take up more time and produce more high quality and rigorous results. Some use time and/or content to differentiate rapid HTAs/reviews and other types of HTA products (Hailey, 2009; Goodman, 2012; Watt et al., 2008).

Compared with rapid HTAs, rapid reviews have been more widely used with a wide range of different purposes and full coverage of technologies (Hailey et al. 2000, 2006; Ehlers et al. 2006; Tricco et al. 2015). 70% of rapid reviews were done in 12 weeks, with 40% done in 6 weeks. Methodology often varies among difference agencies (Featherstone et al. 2015). Evidence search can be restricted on scope or study types, but comprehensive and rigorous review is possible in shorter time. Most rapid reviews have similar results and conclusions with their full counterparts (Tricco et al. 2015).

Rapid reviews are often employed in HTAs, especially those HTAs conducted in a short timeframe. There is no standardized definition of purpose, time frame, format and content of this kind of HTAs. Some do not include quality assessment of the evidences and recommendations. Some do not include economic evaluations, or only include partial economic analysis results (Cameron et al. 2007). No systematic studies have been conducted to understand the influence of such type of rapid HTAs. Although there is proliferation of rapid HTA products and growing use of rapid HTAs, there is a

lack of published literature on rapid HTA methodology (Watt et al. 2008). Canadian Agency for Drug and Health Technologies (CADTH), a national HTA agency even set up a unit on rapid review, tasked with producing such type of HTA products.

Will there always be a trade-off between providing relatively rapid advice to decision makers and losing the detail and assurance provided by use of a more comprehensive process? From November 2009 to March 2011 the Ottawa Hospital Research Institute (OHRI) has produced 11 evidence summaries on a diverse range of questions under the Knowledge to Action (KTA) project. They experimented with incorporating more of the established methods of systematic reviews, while maintaining capacity to deliver a final product in a timely manner (Khangura 2012). The experiments have produced a constant approach and reporting format, which is hopefully leading to production of rapid review protocol in near future (Moher et al. 2015).

Are rapid HTAs really helpful? In 2009, the International Network of Agencies for Health Technology Assessment (INAHTA) conducted a survey on the use and influence of rapid HTAs done by its members. 7 agencies in 5 countries (Canada, Spain, Australia, Brazil, and USA) were surveyed about their use of the methodology. The study indicated that rapid HTAs are a useful form of HTAs, that can help to meet urgent need of decision makers on a wide range of topics, including formulary, capital funding, guideline formulation, and routine practices concerning drug, devices and procedures.

There are other topics for international debates on rapid HTAs, and some even touch on origin of HTAs. Rapid HTAs in some situations are taking processes different from the full HTAs, and how will this process change impact on its potential influence? Or is it a framework of gathering evidence and assembling it for the decision-makers? The key criteria for eligible HTA products are content, rigor and quality. How do we develop a unified framework or procedure for rapid HTAs on the best available evidence within a proper timeframe?

To answer the above questions, we will examine the Chinese experiences in developing and using rapid HTAs. In a large country experiencing rapid development and social change, the Chinese decision-making process is complex and under increasing time pressure. Most HTAs produced by the Chinese national HTA agency took months or even weeks, and are regarded as rapid reviews/HTAs by the existing definitions of rapid HTAs. Even full HTAs are usually took a shorter time than those in other countries.

4.1.2 HTAs and health decision making in China

In China, health decision-making is complex. Over 14 ministries are engaged in health decision-making process, such as the Ministry of Finance, National Health Commission, National Health Insurance Bureau, and Drug Administration (Figure 4 - 1). For another, the decision-making process is long and tedious, and has been highly bureaucratic. Within a structure of 5 tiers of health administration (township, county/city district, city/prefecture, municipality/provincial, national), decision-making is sometimes initiated by either in bottom-up way, with problem-oriented proposals submitted by policy implementers, such as lower level administrations or health managers. But most frequently, it takes a top-down mode, with central decision-makers prioritize the problems based on current or future policy framework, or based on emergent social events or political orders by the highest decision-making organ of the government—the State Council.

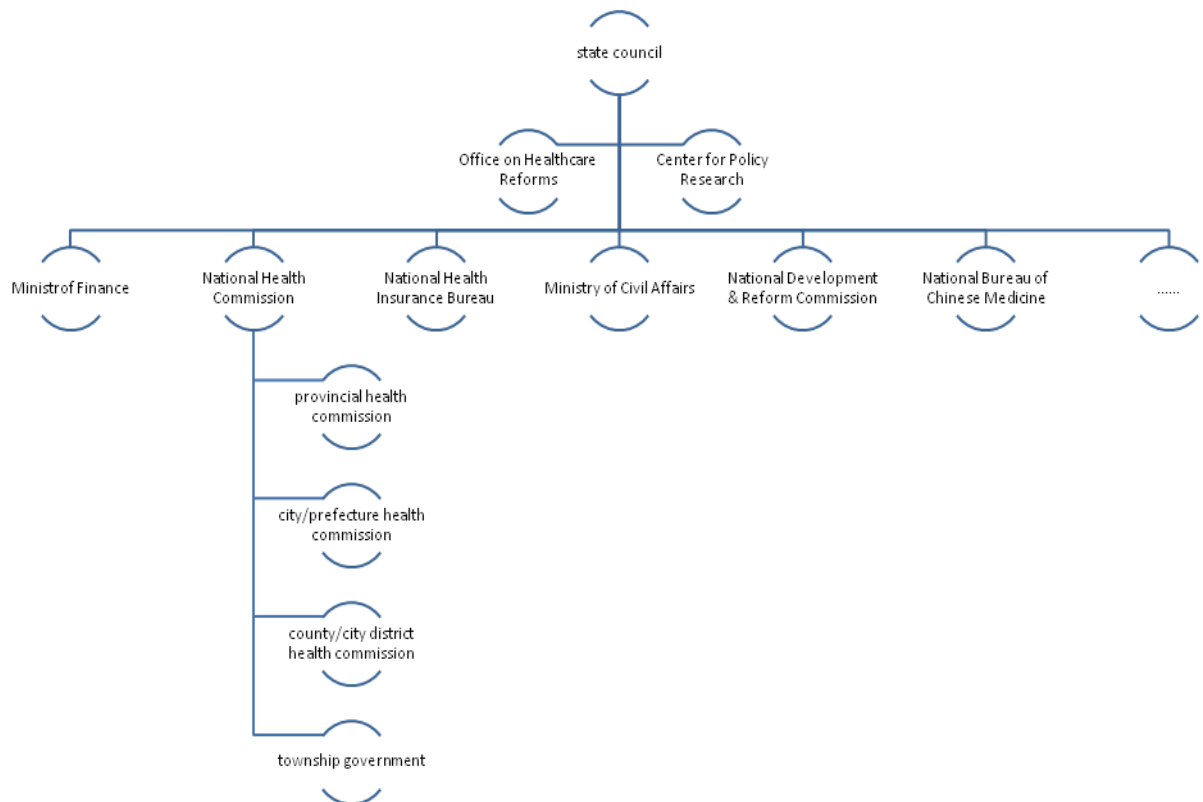


Figure 4 - 1 Health decision-making structure in China

Health technology regulation and governance is centralized at national and provincial level. Take costly medical devices for instance. Based on the latest policy on procurement licensing, capital funding decisions of medical devices with a cost per set over 4 million USD (such as proton radiotherapy and Tomotherapy), will be made by the National Health Commission. These devices are “Type A” devices. While provincial governments will make decisions on funding and procuring “Type B” devices, namely those with a cost between 130-400 USD, including Da Vinci surgical robots, PET/CTs and linear accelerators. The procurement of the type A and B devices is centrally conducted on a platform managed by the Center for International Collaboration and Exchange of the National Health Commission (NHC). For public or private hospitals that hope to acquire type A devices, they need to file application to the city/prefecture health authority, and the file will be reviewed and approved by the provincial government before being sent to the National Health Commission (

Figure 4 - 2).

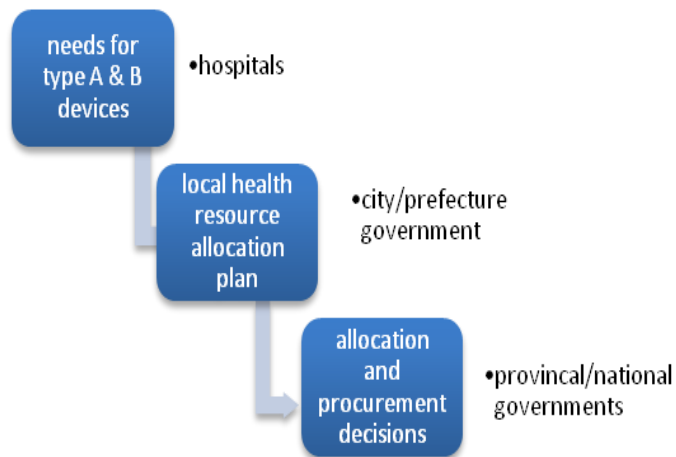


Figure 4 - 2 Decision-making of "Type A & B" medical devices

Since 2009, the Chinese government has launched radical healthcare reforms and invested 140 billion US dollars in the initial first 3 years, in order to achieve universal health coverage. During the 12th Five Year Period (2011-2015), quite a few highly advanced technologies, such as surgical robots and Tomotherapy, were funded and allocated to improve the capacity of large medical centers. In a rapidly changing political context and with increasing policy accountability, the Chinese decision-makers have begun to seek help from researchers and evaluators, including HTA practitioners. With greater demand for high quality evidence and knowledge and more need for ever-faster decisions, the HTA system took root and grew quickly.

The China National Health Development Research Center (CNHDRC) is a national think-tank with official role in providing evidence and knowledge for health policy-making. It launched a HTA program in 2009 and set up a designated division on policy evaluation and HTA, to cater to rising demands for comprehensive knowledge from the government. The HTA Division based in CNHDRC has started exploring formal HTA system and mechanisms, and developed guidelines and methodology, built capacity and conducted HTAs on various topics, including drugs, devices, diagnostics, disposables, clinical procedures, and vaccines and public health interventions.

Most full HTAs done by CNHDRC took 1 year to complete, while rapid HTAs took 2 weeks to 3 months (Table 4 - 1). The decision purposes have covered

various types, ranging from capital funding, listing, and to market withdrawal. Seen from methods and contents, there are no big differences from rapid and full HTAs, except restricted evidence search in the really short timeframe (2 weeks). Reports and policy briefings are common products of HTAs, only differentiated in terms of contents for distinctively different decision purposes, such as market withdrawal.

On October 26, 2018, a National Center for Medicine and Health Technology Assessment (NCMHTA) was established building on CNHDRC's prior work, signaling a new era of HTA development in the country. Guidelines on evaluation and assessment of cancer, cardiovascular, and pediatric drugs are under development by the NCMHTA, while the National Health Commission will develop a national real-world performance management E-system, with an HTA-based indicator system for evaluating medical devices developed by NCMHTA. The unique HTA framework, process and reporting format explored by CNHDRC in previous HTA work will be institutionalized in these guidelines, procedures and indicator system.

Nested in a national think-tank known for its unique role in health decision-making, the Chinese national HTA agency originates in the center of decision-supporting apparatus, and has a close relationship to decision-makers and other end-users of evidence through regular and appropriate contact. This could also explain the features of the Chinese approach to rapid HTAs. The following section will analyze the China approach to rapid HTAs through two case studies.

Table 4 - 1Main HTA projects conducted by CNHDRC

Technology	Funder	Decision	Methods	Staff	Time	Product	Contents	Influence
Semustine	Department of Drug Policy, National Health Commission	Market withdrawal	- restricted search of evidence - expert consultation	3	2 weeks	Report, policy briefing	- technical features - clinical use - safety	Formal response to the Drug Administration
Hepatitis C drugs	WHO China Office	Policy advocacy	- restricted search of evidence - expert consultation - questionnaire survey - economic evaluation	6	3 months	Report (English & Chinese), policy briefing(English & Chinese)	- technical features - clinical use - safety - effectiveness - cost-effectiveness - budget impact	- WHO's policy briefing for the national health authority in China - Lancet paper
Hepatitis C drugs	Department of Drug Policy, National Health Commission	Clinical entrance	- full search of evidence - expert consultation - economic evaluation	5	1 year	Report, policy briefing	- technical features - clinical use - safety - effectiveness - cost-effectiveness - budget impact	- evidence for listing of the national essential drug list - drug innovation funding decision
Bosentan	Department of Drug Policy, National Health Commission;	Listing	- restricted search of evidence - expert consultation	3	2 weeks	Report (23 pages with appendices)	- technical features - clinical use	drug listing of the national health insurance scheme

	National Health Insurance Bureau		<ul style="list-style-type: none"> - economic evaluation - patient interviews 				<ul style="list-style-type: none"> - safety - effectiveness -cost-effectiveness - budget impact 	
Injectable vitamins (12)	Department of Drug Policy, National Health Commission; National Health Insurance Bureau	listing	<ul style="list-style-type: none"> - restricted search of evidence - expert consultation - price comparison 	3	2 weeks	Report (14 pages with appendices)	<ul style="list-style-type: none"> - technical features - clinical use - safety - effectiveness - cost analysis 	drug listing of the national health insurance scheme
Da Vinci surgical robots	Department of Finance and Planning, National Health Commission	Capital funding for the 12 th Five Year	<ul style="list-style-type: none"> - full search of evidence - expert consultation - BIA 	9	6 weeks	Report, policy briefing	<ul style="list-style-type: none"> - technical features - clinical use - safety - effectiveness -cost-effectiveness - budget impact 	Tightened capital funding and clinical management
Da Vinci surgical robots	Center for International Collaboration and Exchange, National	procurement, rational use	<ul style="list-style-type: none"> - full search of evidence - expert consultation - cohort study (RWD) - economic evaluation 	8	1 year	Report, policy briefing	<ul style="list-style-type: none"> - technical features - clinical use - safety 	<ul style="list-style-type: none"> - improved procurement and clinical accountability - Key indicator set for

	Health Commission						- effectiveness - cost-effectiveness - budget impact	assessing surgical devices
Orthopedic surgical robots	Department of Science, Technology and Education, National Health Commission	Response to the State Council	- full search of evidence - expert consultation - key informant interviews - economic evaluation	5	3 months	Report, policy briefing	- technical features - clinical use - safety - effectiveness -cost-effectiveness - budget impact	- proved value of innovative domestic medical products - launch of pilot studies in 30 hospitals
Proton radiotherapy	Department of Science, Technology and Education, National Health Commission	Response to the State Council	- full search of evidence - expert consultation - field visit - key informant interviews - BIA	8	3 months	Report, policy briefing	- technical features - clinical use - safety - effectiveness -cost-effectiveness - budget impact	-tightened regulation -evidence-based planning
Heavy ion radiotherapy	Department of Science, Technology and Education, National Health Commission	Response to the State Council	- full search of evidence - expert consultation - field visit - key informant	8	3 months	Report, policy briefing	- technical features - clinical use - safety	-tightened regulation - evidence-based planning

	Health Commission		interviews - economic evaluation				- effectiveness -cost-effectiveness - budget impact	
Tomotherapy	Department of Finance and Planning, National Health Commission	Capital funding for the 12 th Five Year	- full search of evidence - expert consultation - key informant interviews - BIA	9	6 weeks	Report, policy briefing	- technical features - clinical use - safety - effectiveness -cost-effectiveness - budget impact	Tightened capital funding and clinical management
Tomotherapy and its use in public hospitals	Center for International Collaboration and Exchange, National Health Commission	procurement, rational use	- full search of evidence - expert consultation - key informant interviews - cohort study (RWD) - economic evaluation	10	1 year	Report, policy briefing	- technical features - clinical use - safety - effectiveness -cost-effectiveness - budget impact	Tightened capital funding, procurement, and clinical management
HPV vaccine	Bill & Melinda Gates Foundation	Influenza vaccine policy	- full search of evidence - expert consultation - economic evaluation	3 (only eco. Eva.)	1.5 year	Report, policy briefing	- technical features - clinical use - safety - effectiveness	—

							-cost-effectiveness - budget impact	
PCV vaccine	Bill & Melinda Gates Foundation	Influence vaccine policy	- full search of evidence - expert consultation - economic evaluation	4	1.5 year	Report, policy briefing	- technical features - clinical use - safety - effectiveness -cost-effectiveness - budget impact	-

Notes: Work on HPV and PCV is ongoing.

4.1.3 Case studies of rapid HTAs in China

(1) Rapid HTA for costly medical devices

In the end of 2012, the Department of Finance and Planning of the Ministry of Health submitted a proposal of capital funding of quite a number of type A medical devices, including Da Vinci surgical robots, Tomotherapy, Cyberknife, and Truebeam & Truebeam Stx. The health minister asked for economic evidence on funding and procuring these costly new technologies. The researchers in the HTA Division of CNHDRC were commissioned to provide evidence within 4 weeks. After literature search on methodologies and consultation of other HTA agencies, an 8-step rapid review method developed by the Ottawa Hospital Research Institute (OHRI) were chosen and adapted as the main way to conduct the HTAs.

Table 4 - 2 shows the adapted OHRI method, and the adaptations were highlighted in tilted form.

Table 4 - 2 Adapted OHRI rapid review method

Steps	Activities	Time
1	Needs assessment	week 1
2	Question development and refinement	week 1
3	Proposal development and approval	week 1 & 2
4	Literature search	week 2-4
5	Screening and selection of studies <i>and expert consultation</i>	week 3-4
6	<i>Real-world data collection, budget impact analysis</i> , narrative synthesis	week 5
7	Report production	week 6
8	Ongoing follow-up with end users	after week 6

Need assessment is an initial step of the whole method. The researchers contacted and discussed the decision questions with the division chief and

main officials in the NHC, to understand the topics better. The background of the studies was helpful for them to identify the key information demanded by the decision-makers, and established that the health minister hoped to see economic information. Introduction of budget impact analysis (BIA) was a major adaptation to the OHRI method. It has been uncommon to conduct BIA for assessments of medical devices in the literature.

Question development and refinement was quite a complicated process. A quick scoping study was done before the initial proposal was developed. Clinical experts and policy-makers were consulted through face-to-face meetings and telephone conversations, to provide feedbacks on the questions. Several key questions were identified: 1) What is the technology? (engineering/technological features) 2) Should China procure the technology in the 12th Five Year Period (2011-2015) (safety, effectiveness, relative cost-effectiveness, social, legal and ethical influence)? 3) How to fund and allocate the technology (budget impact, health service planning)?

Proposal development and approval involved more effort in initial literature search. CNHDRC collaborated with the Chinese Cochrane Center (based in Huaxi Hospital of the Sichuan University) to conduct the evidence search and review. Therefore, the proposals of 2 rapid HTAs, one on surgical robots and the other on radiotherapies were developed jointly by the two research teams. Approval of the proposals was obtained from the Ministry of Health.

Literature search was regarded as key assessment activity. A rapid review was carried out by researchers of the Chinese Cochrane Center. They applied systematic review method and quality assessment, though they limited search to HTAs and systematic reviews (+/-) meta-analysis in Chinese and English. Some grey literatures or other information were accessed through institutional contact points, including unpublished HTA reports by HTA agencies in other countries, product information on the website of the device manufacturers and regulators, and internal reports by the Chinese medical professional societies.

Studies screening and selection was done. Quality appraisal tools were used

to review evidence quality and final conclusions from the literature review were drawn. Expert consultation and surveys were conducted by the CNHDRC researchers to collect information on these technologies from over various types of key informants, such as manufacturers, clinicians, HTA practitioners in other countries etc. Key information included technical features, regulatory policies, distribution and current use, and pricing and payment policies. The informants were approached and interviewed through email, telephone, and face-to-face talks, depending on their locations and availability. The expert consultation provided rich information than conventional information sources, which was a major adaption of the OHRI method.

Prior to narrative synthesis, real world data were collected from the national cancer registries and three tertiary hospitals in Beijing, to obtain parameters for budget impact analysis (BIA). BIA was done on Beijing Municipality. It used parameters like epidemiological data, procurement and maintenance cost, annual cases of interventional and comparator technology, prices, reimbursement policy, and discount rate. Base case and alternative scenarios of technology replacement were analyzed, to project potential economic impact on patient, hospital, national health insurance and public finance. Conclusions and recommendations were made based on the BIA results. Narrative synthesis was the hardest step. It took into considerations of all information obtained from literature search, expert consultation, BIA. The process also engaged highly experienced policy researchers in CNHDRC.

Report production process was initiated concurrently with each main activities. Therefore, each part of the reports was completed individually. The final report presented findings in 4 parts: 1) overview of the technology (regulation, use, pricing and payment in and out-side China, comparison with alternatives), 2) clinical safety, 3) clinical effectiveness, 4) BIA, and 5) conclusion and recommendations. A one-and-a-half page evidence summary on surgical robot and radiotherapies was compiled, in addition to assessment reports. Templated key research findings and consultation records were attached in the assessment reports. The evidence summaries were revised several times with help of seasoned policy research expert in CNHDRC, to communicate

the evidence in a way that is more comprehensible to policy makers.

Follow-up with the end users was done continuously. The researchers submitted the reports in week 6 to the Division of Medical Devices of the Department of Finance and Planning. The division organized an expert panel of 7-9 clinicians in the related fields to review the findings and conclusions. The CNHDRC researchers presented their findings, and answered questions posed by the experts. In a working meeting of health ministers, the findings were concisely presented in the form of policy briefings, and final conclusions of capital funding decisions were formed based on the findings and recommendations. The procurement quota of these devices was cut to one sixth of the original, resulted in a public spending cut of millions of USD. Rapid reviews of evidence were published in the Chinese Journal of Evidence-Based Medicine in early 2013, reaching a wider audience of HTA practitioners and clinical decision-makers. In 2015 and 2018, a follow-up full assessment of the Da Vinci surgical robots and Tomotherapy were respectively conducted upon the request of the procurement agency of the National Health Commission to examine the issues and cost-effectiveness of applying it in real Chinese settings.

The adaptation of OHRI rapid review method in the above-described studies was regarded as a successful trial on rapid HTA method. It is also the first serious attempt at an HTA methodology in China. The process and evidence review framework developed in the studies have been kept and applied in the following studies, such as proton and heavy ion, hepatitis C drugs, so was the format of reporting (see Table 4 - 1). To some extent, China's approach to full and rapid HTA methodology has gradually formed along repeated experimentations. The following cases of rapid HTAs of essential drugs done at the end of 2018 were a good demonstration.

(2) Rapid HTA of an essential drug

Drugs are a different type of technologies from devices. Rapid HTAs of essential drugs have been trialed by the Chinese HTA practitioners as well.

The following section presents a case of HTA of essential drug for market withdrawal decision.

Semustine (methyl-CCNU) is a cancer drug for a wide spectrum of cancers, such as cancers of digestive system, brain tumors, melanoma, and malignant lymphomas. It was identified by the International Agency for Research on Cancer as Group 1 carcinogenic to humans. In 2018, the China Drug Administration decided to withdraw the drug from the market after a quick review and expert consultation. Since the drug is in the essential drug list and drug benefit package of the basic health insurance, the regulator consulted the opinion of the National Health Commission and National Health Insurance Bureau with the conclusion of market withdrawal.

In December 2018, the Department of Essential Drug Policy of the National Health Commission asked the NCMHTA to conduct a rapid HTA on Semustine, to provide evidence for replying the Chinese Drug Administration's request for comments on market withdrawal of the drug. The rapid HTA was conducted in 2 weeks' time by a team of 3 researchers. Under the general HTA framework, the 8 step rapid HTA method was employed, but with much shortened process and limited search on evidence.

Step 1-3 collapsed, for need was clearly expressed in the request by the national essential drug decision-makers. The proposal was developed and approved based on joint discussions of key questions, and together with a report outline. The rapid HTA approach was taken, with literature review and expert consultation as main assessment activities.

Step 4. Literature search. A restricted literature search was done, mainly on regulation and use of the drug in- and out-side the country, as well as safety and effectiveness. Top priority was given to guidelines published by WHO and other guideline producers, which was followed by HTAs, systematic reviews, randomized clinical trials, cohort studies, and the other studies in English. Since the product has been available in the Chinese market for some time, the Chinese literatures and information were searched, including the national

regulator's website, some patient blogs and telemedicine websites.

Step 5. Screening and selection of studies, and consultation of experts. 130 Chinese literatures and 158 English papers were accessed, and 36 were finally included for review, mainly on safety and effectiveness. 3 clinicians and 3 pharmacists from 5 large teaching hospitals in Beijing (3), Tianjin (1) and Shanghai (1) were consulted for use of the drug.

Step 6. Real-world data collection, BIA, and narrative synthesis. Data on adverse events and reactions were collected from the China Drug Administration with the help of the National Health Commission. BIA was considered irrelevant in this HTA.

Step 7. Report production. The draft report was produced by three researchers. Review was done by experienced policy researchers, with a focus on conclusion and recommendations. The final report was 16-page report with an abstract and attachments (drug specifications, list of expert consulted and main advices, WHO recommendation, published references). The report concluded: "Semustine is clinically risky for use. With more effective alternatives on the market, the drug is no longer considered as suitable for use in China. The market withdrawal is recommended. Meanwhile, other recommendations are made, including 1) delisting from the National Essential Drug List (2017); 2) Delisting from the National and local Health Insurance Pharmaceutical Benefits; 3) National Medical Products Administration (NMPA) issuing black label warning, and instructing manufacturers and hospitals to handle drugs properly".

Step 8. Follow-up with the end users. The follow-up with the target users—decision-makers of the NHC and NMPA is still ongoing. The researchers suggested the National Health Commission and National Health Insurance Bureau to take an extra look at those drugs with high risks and establish a pre-warning system with relevant mechanisms.

4.1.4 Discussions

Based on the rapid review method of the Ottawa Hospital Research Institute (OHRI), the Chinese HTA agency has developed an approach to rapid HTA through repeated experiments, stressing on real-world data collection, budget impact analysis and expert consultation. The approach to rapid and full HTAs in China provides a practical framework of organizing HTAs to meet complex and varied decision-making requirements. Rapid HTAs seemed to be more flexible than full HTAs in scope of literature search and with simplified deliverables.

Rapid HTAs seemed to fit well for assessing different technologies, and for different decision purposes. Speaking overall, except for really rapid studies (2-4 weeks, as in the case of Semustine), most of the rapid HTAs adopted with similar framework and same process as the full HTAs. Such consistency is essential for keeping disciplinary legitimacy. The methodology of China's approach to rapid HTAs continues to evolve. The case studies show that even though actual use of rapid HTAs needs to adapt to specific contexts or decision purposes, a consistent procedure, pathway and reporting format are critical to gain legitimacy in the decision-making process.

From the Chinese rapid HTA method, some common essential features could be identified, such as ongoing engagement of end-users, expert consultation, budget impact analysis (even for devices), and evidence summaries.

Ongoing engagement of end-users sharpened the focus and increased usefulness of rapid HTAs. In the Chinese approach, decision-makers, as initiators of HTA projects, participated in problem defining and proposal approval process right at the start. Clinicians and managers were consulted for feedbacks. Rapid HTAs usually ended with follow-up with the end-users, which sometimes led to second round of HTAs, mostly full HTAs, as the rapid HTAs on Da Vinci robots and Tomotherapy.

Wide consultations contributed to efficient information collection. With rapid HTAs, it is critical to obtain information in a fairly efficient way. Different information or data holders were approached, such as clinicians, manufacturers, general agent, technical experts on HTA, and epidemiologists. The case studies demonstrated the feasibility and good effect of expert consultation. It has become the key method under the normal HTA methodological framework in China.

Inclusion of budget impact analysis (BIA) in all rapid HTAs improved relevance of final conclusions. It is unusual to conduct BIA in rapid reviews or rapid HTAs. However, the Chinese HTA agency places great importance on its mandatory role in informing decision-makers on potential impact of different application scenarios. Parameters of BIA were mostly from real-world settings, which supported the decision-makers in better linking literature-based evidence with real decision context.

Policy-oriented communication and dissemination increased the chance of policy translation. Besides well-structured presentation of evidence, key messages were delivered in a way that is easy for the policy-makers and other non-professional users to understand. The tone and style of the evidence summaries resemble policy-briefings of common health policy studies.

The above-mentioned essential features distinguished the Chinese rapid HTA method from the other rapid review/HTA method. With repeated practices, the method has proved to be helpful, and methodological procedures and framework has formed for the Chinese HTAs, rapid or full ones.

However, future improvements need to be made. For one thing, expert consultation or final appraisal process has not yet been institutionalized in China and this could influence the legitimacy of recommendations of all HTAs. The newly established national HTA agency—NCMHTA—is going to support the national health authority to set up national appraisal committees soon. Such an arrangement may contribute to institutional development of HTA, and

increase accountability of rapid HTAs. For another, restricted search needs to be defined clearly with different decision purposes and varied degree of rapidity. Currently, the NCMHTA researchers usually limit the search to guidelines, HTAs, systematic reviews with or without meta-analysis in really rapid situations (2-4 weeks). For rapid HTAs with longer timeframe (2-3 months), a more fully scoped search was often used to ensure the review quality.

4.1.5 Conclusions

Rapid HTAs, as a more and more common type of HTA products in China, are adopting a consistent framework and process. The procedural and analytical framework developed by the national HTA agency in the country has been widely used for different decision purposes. The Chinese case studies show that even though actual use of rapid HTAs needs to adapt to specific contexts or decision purposes, a consistent procedure, pathway and reporting format has to be adopted to ensure the trust of the target users and win legitimacy in the Chinese decision-making process.

4.2 Priority setting of maternal and child health research in western China

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Abstract

During the early years of 12th Five Year Plan period (2011-2015), Maternal and Child Health (MCH) in the less-developed western regions in China faced double challenges of meeting the national health development targets and the MDGs. Identification of barriers and issues with effective MCH service delivery and provision of targeted evidence to health decision and policy making was considered as helpful for health administrators and other donors to make sound use of the limited resource, and generate and scale up cost-effective interventions and experiences, which will finally contribute to realization of the national MCH development targets and MDGs. Against the above background, the China National Health Development Research Center (NHDRC) identified issues influencing MCH service delivery in the western region through a bottom-up approach by conducting literature reviews and on-site surveys in three counties in three western provinces in China and identified the top 10 research questions by employing a research priority setting tools developed by the Child Health and Nutrition Initiative (hereafter “CHNRI method”) after consulting 3 different groups of experts, namely decision-makers, experts and stakeholders.

4.2.1 Background

There are 870 million women and children in China, accounting for 2/3 of the total population. They are among the key target populations for healthcare services. With deepening of healthcare reform, the overall health status of women and children has greatly improved. Maternal mortality rate (MMR) in 2011 was 26.1/100,000, with a decrease of 51% as compared to 2000. The Infant mortality rate (IMR) and under five mortality rate (U5MR) were 12.1‰ and 15.6‰, with a decrease of 62% and 61% respectively, already meeting MDG goals.

However, there is still big gap in MCH between China and developed countries. Moreover, big regional disparities have still been documented, and MCH in less-developed western region has seen slower development, which challenges achievement of the national MCH development targets and MDGs. Identification of barriers and issues with effective MCH service delivery and provision of targeted evidence to health decision and policy making will help health administrators and other donors to make sound use of the limited resource, and generate and scale up cost-effective interventions and experiences, which will finally contribute to the achievement of the national MCH development targets and MDGs.

Reform and development of MCH has long been a hot topic for Chinese researchers and scholars. There have been a lot of research programs on the status quo of and issues with MCH in western region (Du 1994a, 1994b; Yang et al. 2011; Huang 2009; Tian & Song 2011). Many were concerned with effective MCH service delivery (Chen & Wu 2004; Feng et al. 2010; Cui 2011), and some even discussed the evidence demand of MCH policies (Luo 2010). However, no research has ever been conducted on MCH research priority setting based on barriers of effective MCH service delivery in the western region.

Against the above background, the China National Health Development

Research Center (CNHDRC) proposed to conduct an exploratory research priority setting study, to explore top ten MCH research priorities in the western region in a bottom-up approach by employing a research priority setting tool developed by the Child Health and Nutrition Initiative (CHNRI) (Kapiriri et al. 2007; Rudan et al. 2008) in assessing barriers and issues in MCH development in three western provinces, namely Qinghai, Sichuan and Guizhou. The aim is to identify top 10 research questions of MCH development in the western region of China, with consideration of the MDGs and national MCH goals.

4.2.2 Research design and methods

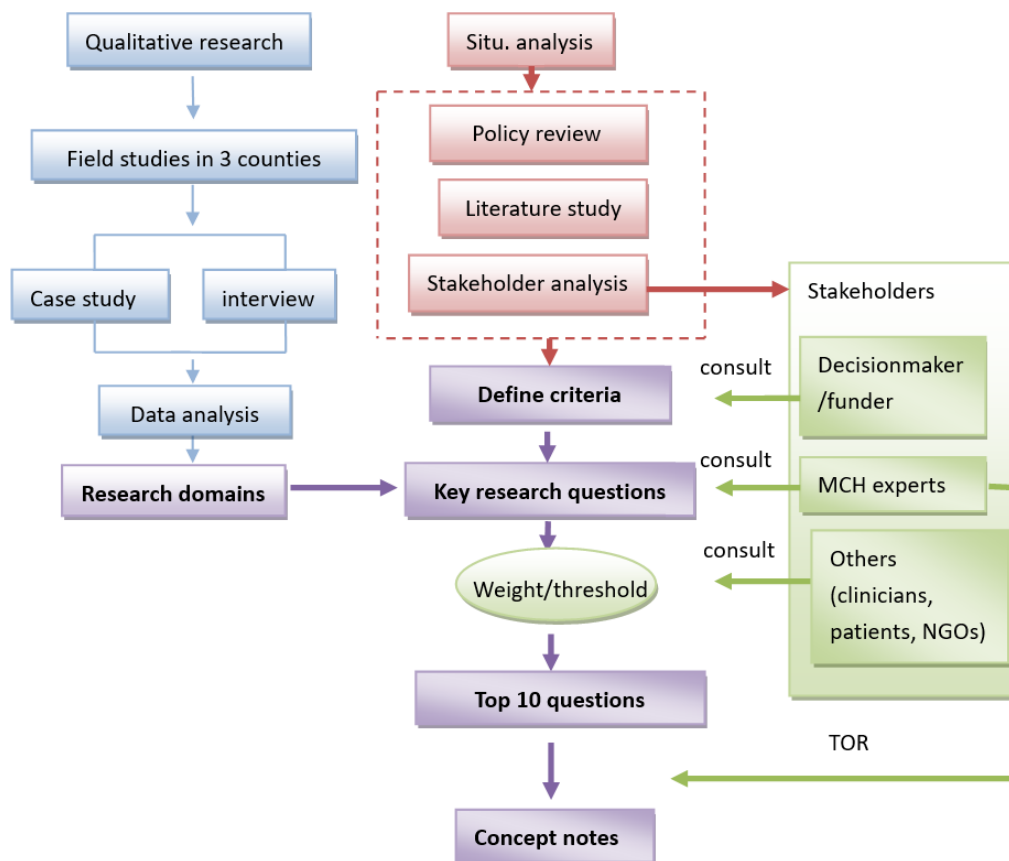


Figure 4 - 3 Research design

Design of research activities

The research team designed the research programme as shown in Figure 4 -

3. They used mixed methods and conducted context analysis to understand the local situations. In the process, they engaged multiple stakeholders at different stages. The aims of each stage were as below:

Situational analysis

- Understand objectives, targets and agenda setting mechanisms for MCH reform and development in Qinghai, Sichuan and Guizhou Province by reviewing policy documents.
- Understand current status quo and issues with MCH development in the three western provinces through literature review, mainly focusing on: (1) current status of MCH service delivery system; (2) key barriers and issues with MCH service delivery; (3) new interventions or measures to improve service delivery efficiency.
- Conduct critical stakeholder analysis. On one hand, findings from field investigations need to be fed back to critical stakeholders to facilitate mutual learning and communications. On another hand, a certain number of critical stakeholders who works on MCH decision making, program implementation and research, need to be engaged in research prioritization process as consultants.

2. Identify key research domains

- Select a county from each province for field study, to understand key issues and challenges faced by local MCH service delivery systems, functional and institutional adjustment and innovations made by them and potential reforms measures they should undertake.

3. Research prioritization

- Define key research domains based on findings from field investigations. Consultants will propose key research topics for each research domain. The top ten research questions will be identified by using CHNRI method.

3. Preparation of TORs

- Organize experts to develop concept notes for top ten priority research questions based on terms of references (TORs). The concept notes should define research background, goal, main activities, expected outcomes and timelines for each research topic.

Methods

1. Literature review

Local MCH priorities, policy targets and key programs were studied by reviewing the related literatures at macro, meso, and micro-level in the three rural counties of Guizhou, Sichuan, and Qinghai. Local MCH service delivery systems and their issues will be better understood with the situational analysis, to prepare for identification of key research domains and questions.

2. Qualitative methods

This project mainly employed qualitative research methods to conduct field investigations. With consideration of representativeness and variations, we chose three counties as research sites, namely, Majiang County (which locates in Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province), Puge County (which locates in Liangshan Yi Autonomous Prefecture, Sichuan Province), and Menyuan Hui Autonomous County (which locates in Haibei Tibetan autonomous prefecture, Qinghai province).

Research objects in each county included the MCH division of the provincial health bureau, 1 county hospital, 1 county MCH center, 1 township health center, and 1 village clinic. Semi-structured group interview and key informant interview were employed to consult health administrators (n=5), medical staff (n=36), and patients (n=9). The local health administrators were MCH division chiefs in three provinces, and they helped to sample the health facilities. The heads of the sampled health facilities helped to sample the medical staff. And the patients were selected randomly by the researchers during their visit to the health facilities. Managers of priority setting process employed independent theme analysis (Giorgi 1995) to summarize and analyze interview data. On the basis of that, key domains and key research questions which influence MCH service delivery systems of western China were identified.

3. Quantitative methods

Quantitative data on health infrastructure, resources, and MCH service delivery capacity were collected by questionnaire surveys. Three sets of questionnaire survey forms were developed for collecting information and data from the county health bureaus (n=3), county and township hospital (n=9), and village clinics (n=3). Altogether 15 questionnaire surveys were sent out

and all returned.

4. Stakeholder consultation

On the basis of field investigation and literature review, key domains and research questions were identified. Health policy and decision makers (n=6) were invited to define evaluation criteria. Then experts in relevant fields (n=17) were consulted for scoring important research questions based on the criteria and research domains identified in previous stages. 19 other types of stakeholders, including pediatricians (n=4), obstetricians (n=4), mothers (n=6), representatives from international organization (n=3), media people (n=1), industry representative (n=1) were consulted for setting threshold and weight for each criterion. It was followed by ranking and prioritizing of research topics based on weights and thresholds in descending order. The top 10 MCH research questions were identified.

4.2.3 Research findings

Review of evidence

From the perspective of complex adaptive system (Rous 2008; Paina & Peters 2011), the research team analyzed current status quo and issues with MCH development in the three western provinces through literature reviews from macro-, meso-, and micro-level, finding out many factors influencing the effective supply of MCH service in western China.

Field study findings

The researchers conducted field investigation on Majiang County located in Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, Puge County located in Liangshan Yi Autonomous Prefecture, Sichuan Province, and Menyuan Hui Autonomous County located in Haibei Tibetan Autonomous Prefecture, and Qinghai Province from November to December, 2012.

1. Quantitative analysis results

Based on the field study findings, with health resources of local MCH institutions were insufficient, with numbers of health professionals, licensed doctors (assistant physician), and registered nurses per 1,000 population lower than the national average. The proportion of funds for MCH investment ranged from 1.8% to 3.23% of the total public health spending. With limited operation scale, revenues of MCH centers in three counties (especially those in Sichuan and Qinghai Province) were mainly from public input. The project of “Decreasing MMR and eliminating neonatal tetanus” (“Decreasing and eliminating” in short) has been implemented in three counties, and to some extent, lowered local women’s financial burden of hospital delivery. Meanwhile, three counties are mountainous areas with poor transportation infrastructures, which hindered local women and children’s visits to health institutions. As a result, indicators such as hospital delivery, maternal and under-five child mortality were affected negatively.

Spaces of MCH centers in three counties were sufficient, but the staff’s competence was poor, and accessibility of health services was low. Some necessary facilities were lacking, while some others were left unused. Professional skills of medical staff working in township health centers in three counties varied significantly. Some large ones are able to provide hospital delivery services, while small ones can only provide routine public health services. Village clinics usually had unskilled staff who were poorly incentivized with very low income, and shortage of facilities was also a big issue for them to provide services.

2. Interview findings

The interview findings are structured around the WHO framework that describes health systems in terms of six “building blocks”: service delivery, health workforce, information, medicines, financing and governance.

(1) Service delivery: service delivery by MCH centers have been affected by many factors, such as shortage of staffing personnel, practicing of unlicensed staff, brain drain and ineffective training, to name a few.

Mergers between MCH centers and other types of health facilities are very

common in western China, which may have hindered MCH service delivery in MCH centers. There were a lot of issues with infrastructures of MCH institutions at various levels, old equipment in county hospitals, shortage of facilities in MCH centers, and lack of basic facilities and relevant operation skills in village clinics. Meanwhile, functions and roles of MCH centers were unclear. With shrinking obstetric services and poor clinical skills, medical staff can hardly supervise obstetric care provided by township health center staff. Utilization and accessibility of MCH service were low, and service provision was challenged by various factors. For example, Puge County is a mountainous area with poor transportation, and the geographical situation made it difficult for local women and children to seek care. Many ethnic minority people lived in the county and lacked knowledge of prenatal care, hospital delivery and child healthcare due to low education levels, traditional culture and ethnic customs. On the other hand, health education has not been conducted properly and adequately. Only a few advocacy approaches were effective with the local people, who most of times they did not really follow health education.

- (2) Health workforce: Due to a lack of targeted-aid projects, staff training was problematic in these MCH facilities. What's more, frequency of training was low and time was very short, which has resulted in poor training outcomes.
- (3) Information: a three-tier computer-based information system at county, township and village level has been confusingly developed in an uncoordinated way, which has made it difficult for quality control and supervision, and which has even influenced efficiency of information collection by MCH centers. Information systems in MCH institutions were underdeveloped. Without proper hospital information systems, health facilities were facing issues with data reporting and monitoring and supervision of MCH service.
- (4) Medicine: many essential medicines for women and children were either in shortage of supply or not available on the village or township clinician's medicine inventory.
- (5) Financing: prominent issues with MCH service delivery in three counties

were underpayment of services covered by the NCMS and lack of counterpart local funds for management of some earmarked national programs, such as screening of breast and cervix cancer, and prevention of mother-to-child transmission of HIV. The reimbursement rate of inpatient care was high in the local hospital, and local patients preferred to stay in hospitals, leading to insufficient beds and delayed admission and treatment for those patients who were in urgent need of inpatient care.

(6) Governance: the local health bureaus in the counties were weak, and lacking policy making and implementation capacity. Supportive policies for MCH were either non-existing or have not been fully adopted locally.

The main findings are as follows. Economic development and education in three provinces in western China lagged behind the national average level. Policies on staffing, network construction, operational management and monitoring are not well-developed. There is a lack of supportive policies and current policies have not been fully implemented. Public financial input for county MCH centers is insufficient. Resources allocation between MCH care centers at various levels is not optimal. Functions and roles of MCH centers are unclear and many institutions pay more attention to clinic care. There sees overlaps in functions and competition in service provision between MCH service providers including MCH centers, hospitals, and family planning agencies. MCH centers lack beds, advanced facilities, and qualified staff. The variations in utilization and accessibility of MCH service exist between rural and urban areas exists, and the urban areas are generally better off than rural areas.

Against the background of above-mentioned findings, the researchers have identified 24 key research options about effective MCH service delivery in western China, which cluster in 5 key domains, namely, law and regulation, mechanisms and institutional development, personnel and capacity building, financing and funding and others (Table 4 - 3).

Table 4 - 3 Potential research questions

Domains	Research questions
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Laws and regulations	<p>1) Influence of the Family Planning Service Card on maternal and child health and safety.</p> <p>2) Mechanisms on licensing of county and township health staff at former revolution bases, rural, remote places or poverty-stricken areas dwelled by minority in western China</p> <p>3)Occupational safety mechanisms in MCH institutions at former revolution bases, rural, remote places or poverty-stricken areas dwelled by minority in western China</p>
The system and mechanisms	<p>4)Mechanisms for integrating service delivery functions of MCH institutions and other related institutions in western China</p> <p>5) Functions and roles of county MCH centers in western China</p> <p>6)Incentives for county and township MCH personnel in western China</p> <p>7)Implementation of major MCH earmarked projects in western China</p> <p>8)The standardized infrastructure development of county and township MCH facilities in western China</p> <p>9)Linkage and integration of information reporting systems of MCH institutions in western China</p>
Personnel	<p>10)MCH staffing of county and township medical institutions in western China</p> <p>11)Education and training strategies for medical personnel in western China</p> <p>12)Recruitment and retention mechanisms that should be adopted by MCH institutions in western China</p> <p>13)Appropriate training for MCH personnel in western China</p> <p>14)Recruitment, retention and training of village doctors in ethnic minority areas in western China</p> <p>15)Research on training mode of township and village midwifery skills in remote areas in western China</p>
Funding	<p>16)Sustainable funding mechanism concerning earmarked national MCH program in western China</p> <p>17)Public funding and input for MCH facilities by government agencies at various levels in western China</p> <p>18)Impact evaluation of earmarked national MCH programs in western China</p> <p>19)Priority setting of infrastructure investment on MCH institutions at county, township and village level in western China</p> <p>20)Payment method for hospital delivery in western China</p> <p>21)Research on compensation mechanism for major children agencies</p>

at various levels

22) Innovative mechanism of improving accessibility of hospital delivery for poor women in remote western China

Others	23) Health advocacy and education on MCH knowledge in ethnic minority areas in western China
	24) Systematical management of HIV/AIDS among key maternal and children population in western China

Priority setting

1. Decision criteria

In consideration of the background and research questions, the researchers selected a set of priority setting criteria with reference to CHNRI method, namely “5 plus X” criteria. 6 health policy and decision makers in MCH field (Attachment 5) were engaged in selecting and scoring criteria. Each criterion was scored from “1” (meaning “I agree”) to “5” (meaning “I disagree”). Scores of each criterion was summarized then in descending order, and top 10 criteria were defined in this way (Table 4 - 4). 10 criteria were identified for selecting priority research questions in MCH field in western China.

Table 4 - 4 Priority-setting criteria

5 Key criteria	Order
Answerability	1
Effectiveness	2
Deliverability	2
Maximum potential impact on burden	2
Equity	2
“X” criteria	
Public opinion	3
Sustainability	3
Potential for translation	4
Affordability	5
Ethical aspects	6

2. Scoring

17 MCH experts in different research fields were invited to confirm and score research questions (Table 4 - 3) by using the chosen 10 criteria. MCH experts

scored independently and submitted their own scores

A two-dimension table was designed, with all the research questions in the vertical column on the left and criteria in the horizontal rows. Each expert's score for each question was listed under each question. The answer to each question can be chosen from the following 4 options:

-“Yes”(1),

-“No”(0),

-“Undecided answer”(0.5), and

-“Insufficiently informed” (---)

3. Threshold and weight

To ensure objectiveness of scoring results, the researchers invited 17 other critical stakeholders to set threshold and weight for each criterion. Other stakeholders include 4 gynecologists, 4 pediatricians, 6 representatives of patients, 1 representative of pharmaceutical company, 3 representatives of domestic NGOs working in MCH, and 1 media people.

Two methods were used in scoring weight. One is “relative weight scoring” recommended by CHNRI, and the other is “absolute weight scoring” employed by the researchers, in the hope that two different methods might help to correct scoring bias. It turned out that scoring results by using two weighting methods did not have any difference.

4. Calculation and testing

Each research question first achieved its intermediate score. The number of intermediate scores equals the number of selected criteria, as each intermediate score indicates likelihood that the research question would satisfy a specific criterion. There are 10 intermediate scores in this research. Each criterion's mean threshold and weight scores given by 19 stakeholders was calculated, as shown in Table 4 - 4. “Threshold” (0-100) is the minimum score for a research question to secure funding and “weight” (0-100) represents the relative importance of each criterion.

Table 4-4 Average threshold and weight for each criterion

Criteria	Average threshold	Average weight	Average weight
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		(relative)	(absolute)
Answerability	0.33	0.11	0.51
Effectiveness	0.38	0.09	0.60
Deliverability	0.28	0.10	0.78
Maximum potential impact	0.29	0.14	0.77
Equity	0.29	0.11	0.62
Public opinion	0.41	0.07	0.52
Sustainability	0.33	0.11	0.71
Potential for translation	0.33	0.10	0.67
Affordability	0.40	0.10	0.56
Ethical aspects	0.38	0.07	0.38

Overall priority score and ranking

(1) Comparing intermediate scores with average thresholds.

The researchers compared 10 intermediate scores of each question with average thresholds. Research questions that failed to pass all thresholds should be excluded at this stage. In this research, only “Occupational safety mechanisms in MCH institutions at former revolution bases, rural, remote places or poverty-stricken areas dwelled by minority in western China” failed to pass the thresholds and was taken out.

(2) Calculating OPS and ranking research questions

Each research question had 10 intermediate scores (IS) and 10 related weights (W). The overall priority score (OPS) was calculated for each question based on CHNRI method:

OPS=

$$\frac{[(IS1 * W1) + (IS2 * W2) + (IS3 * W3) + (IS4 * W4) + (IS5 * W5) + (IS6 * W6) + (IS7 * W7) + (IS8 * W8) + (IS9 * W9) + (IS10 * W10)]}{(W1+W2+W3+W4+W5+W6+W7+W8+W9+W10)}$$

Ranking research questions in descending order based on OPSs.

Top 10 research questions were identified (Table 4-5). Those questions belong to three research domains, namely, mechanisms and institutional development, personnel and capacity building, financing and funding, most of which are policy-related research questions based on studies of current status quo, and are in line with our research goal and objectives.

The top 10 research questions are related to the following topics: compensation mechanism for major diseases, implementation of major earmarked national MCH programs, personnel recruitment and retention mechanisms in MCH institutions, and accessibility of hospital delivery, etc. The researchers conducted “absolute weight scoring” to assure the objectiveness of priority setting, that was to ask the experts to use a 1-100 scale for direct weighting of the 10 questions. This was different from the relative weighting used in CHNRI—splitting 100 scores among the 10 questions. And it turned out that two different method got the same results. This is a meaningful effort in testing applicability of CHNRI method in China.

(5) Assessment of expert agreement

Because of its transparency and independent scoring by the larger group of experts, the CHNRI method is able to expose the questions with the greatest agreement and controversy among experts. The agreement has not been assessed by using κ statistics because the datasets that CHNRI method produces (eg, allowing for the existence of missing response) are not really appropriate for application of the usual κ statistics (Byrt 1996; Cicchetti & Feinstein 1990). Instead, we reported the average expert agreement (AEA) as recommended by the CHNRI method, this is computed for each scored research question as:

$$AEA = \frac{1}{10} \times \sum_{q=1}^{10} \frac{N(\text{scorers who provided most frequent response})}{N(\text{scorers who provide d any response})}$$

(q is a criterion, ranging from 1 to 10)

Each research question has an AEA, which can inform us about the extent to which the experts agree to have the question as a priority (eg, when AEA is about 60%, this means that for an average research question, 3 out of 5 scorers gave the most frequent answer).

AEAs of the top 10 research questions did not vary much, ranging from 62.0% to 82.0% (Table 4 - 5). However, AEAs of all 24 research questions saw great variations, from 36.0% to 86.0%, indicating that experts had different views of different research questions.

Table 4 - 5 The average expert agreement of the top 10 questions (%)

No.	Research Question	Domain	1	2	3	4	5	6	7	8	9	10	AE A	OPS (relative)	OPS (absolute)
1	compensation mechanism for major children's diseases in western China	Funding	100	91	100	100	100	95	91	95	91	77	62	95.0	94.9
2	training mode of township and village midwifery skills in remote areas in western China	Human resource	97	88	97	82	85	91.	91	94	91	79	86	89.8	90.0
3	Payment method for hospital delivery in western China	Funding	94	82	85	91	97	85	85	88	88	91	82	89.1	88.6
4	Implementation of major MCH earmarked projects in western China	System and mechanism	97	97	97	74	85	88	88	85	94	76	82	88.1	88.3
5	Incentive mechanisms for county- and township-level MCH personnel in western China	System and mechanism	91	94	91	68	88	94	94	91	91	76	84	87.4	87.9
6	Appropriate training for MCH personnel in western China	Human resource	94	91	91	76	74	94	91	97	88	65	78	86.2	86.8
7	Recruitment and retention mechanisms that should be adopted by MCH institutions in western China	Human resource	91	91	85	71	79	88	91	88	82	71	78	83.7	84.0
8	Innovative mechanism of improving accessibility of hospital delivery for poor women in remote western China	Funding	79	79	71	88	91	91	85	79	82	82	76	83.0	82.7
9	MCH staffing of	Human	88	88	88	74	85	82	85	76	85	62	73	81.9	82.0

county and resource township medical institutions in western China																			
1 Mechanisms System 0 for integrating and service delivery mechanis functions of m MCH		82	91	91	74	82	82	85	74	76	68	74	80.8	81.1					
institutions and other related institutions in western China																			

1: Answerability, 2: Effectiveness, 3: Deliverability, 4: Maximum potential impact on burden, 5: Equity, 6: Public opinion, 7: Sustainability, 8: Potential for translation, 9: Affordability, 10Ethical aspects

4.2.4 Discussions

The study was a novel trial on research priority setting in the area of maternal and child health. For the CNHDRC researchers, it was the first attempt to support the UNICEF and central-level decision-makers in prioritising research funding resources. In the process, they introduced CHNRI method with conventional methods of literature review and field survey, and explored the methodological approach of conducting similar research priority-setting in the country.

By the time of writing the paper, CNHDRC organised experts in preparing the terms of reference for the top 10 research topics for UNICEF, which have been used for funding the next round of UNICEF projects. The method has raised interests among the health policy-makers at the central level, and the Department of Health Legislation and Policy Making has commissioned CNHDRC in conducting a new study of research priority-setting of healthcare reforms. Use of the research findings and further development of the exploration of the methodological approach in the country has demonstrated the vitality of the research priority-setting method.

From the current study, we raise three points for further attention by the Chinese researchers and other policy stakeholders:

1. Methodological approach to research priority setting

The Chinese health researchers as a whole were new to the research priority method. They learnt the way of applying the commonly used CHNRI method in the Chinese context. In the “learning by doing” mode, they made some adaptation and accommodation of the method without changing the main technical parts of it. This is a development and expansion of the research methodology of research priority setting. It may reveal some interesting lessons for researchers in other low- and middle-income countries.

2. Innovation of the methodological approach

Facing complex situations in the poor rural counties in the western part of China, the CNHDRC researchers needed to capture the main problems with the maternal and child care delivery system. They first reviewed literature, and built a theoretical framework for designing tools of field survey. Then they conducted field survey in three counties, to interview local administrators, managers, and care providers for gaining some understanding of the local situation. Such an approach was an extension of the original CHNRI approach. From the follow-up of the use of the study findings, it did support the research priority-setting in maternal and child care. It would apply to other wider areas such as research on priorities of healthcare system reforms. This should be regarded as an innovation of the research priority-setting.

3. Learning about the method as well as application of the method

In actual implementation the CHNRI method both researchers and users of the research have learnt more about the method itself. Therefore, it is proper to call the study itself as a vessel for learning. Through a series of research activities conducted in the local contexts, the researchers, research funders, and research subjects discussed issues and focus of research, which has facilitated learning of the research topics in the local situations. Such situated learning is helpful for transforming the learning from superficial method learning to a deep-rooted learning of the rationale, need, and actual application scenario of the method, which can support the contextualisation and localisation of the method. Such a learning is more crucial for the research community and its key stakeholders. The researchers played a key role in designing, facilitating and contributing to the learning process. They were both learners and learning facilitators, though reflection and innovation of all learners is key for the successful learning.

4.2.5 Conclusions

The CNHDRC researchers explored using a novel research priority-setting method locally in China. They designed and facilitated the learning and applying of the CHNRI method. In the process, they adapted and expanded

the methodological approach to make it more applicable for the local situation. Such an innovation was important for successful application of the method. The usefulness and effectiveness of such approach has been demonstrated by further use of the method in the other study. This methodological learning was a successful trial in the area of research priority-setting.

4.3 Cost-effectiveness analysis of high impact child survival strategy

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Abstract

Maternal and child health is an important part of the Healthy China 2030 Plan. To assist China's health policy makers in developing a maternal and child health plan for the 13th Five-year Plan period, a group of researchers at the China National Health Development Research Center, supported by the United Nations Children's Fund (UNICEF) China, has conducted a cost-effectiveness analysis of a package of high-impact child survival interventions in China. An intervention package was defined through literature reviews and multiple consultations, and cost-effectiveness of the interventions was analyzed to inform priority setting by employing the "One Health Tool" (OHT), a health program/system planning software tool developed by the World Health Organization (WHO) and other international agencies. Chinese Demographic data and basic mortality parameters, cost parameters and effect parameters have been included.

According to estimates and analysis, China will save many women and children's lives at lower costs in the next five years. The implementation of 24 effective interventions may reduce maternal mortality to 13.67/100,000, and infant and under-five child mortality to 6.21‰ and 8.26‰, respectively. As a

result, the deaths of 79,000 newborns and 126,000 children under five could be averted by the end of 2020.

The 24 most effective interventions are recommended for inclusion in China's child survival strategy essential package. Taking into consideration the financial feasibility of these interventions at central and local levels, a gradual, step-wise approach to scale up is advised.

Key words: Maternal and child health plan; Child Survival Strategy; efficient interventions; cost effectiveness

4.3.1 Introduction

The improvement of maternal and child health contributes substantially to China's social development. In particular, improving child health is of great significance for population health. The average life expectancy of the Chinese population increased by 4.4 years from 1990 to 2005, of which an increase of 48% was attributed to the decline in the mortality of children under five (Healthy China 2020 Compilation Committee 2012).

During the 12th Five-year Plan period (2011-2015), and along with the deepening of reform of the medical and health system, the health of women and children has improved rapidly. Nationally, the maternal mortality rate (MMR) decreased from 30.0 per 100,000 live births in 2010 to 21.7 per 100,000 live births in 2014, a decline of 27.7%. The mortality rate of infants and children under five decreased from 13.1 per 1,000 live births and 16.4 per 1,000 live births in 2010, to 8.9 per 1,000 live births and 11.7 per 1,000 live births in 2014 respectively, declines of 32.1% and 28.7%¹. Millennium Development Goals (MDGs) 4 and 5, and targets set in the *National Program of Action for Women Development* and *National Program of Action for Child Development* in China were achieved ahead of time (NHFPC 2016).

However, due to China's large population base, the number of child deaths remains high and ranked the fifth in the world in 2012. The gap between MMR and the mortality rate of children under five (U5MR) between urban and rural

areas and among different regions has narrowed but remains significant. The mortality rates of neonates and children under five in rural areas are 2.4 times and 2.7 times those in urban areas. At the sub-national level, the U5MR in the worst provinces was 8 times higher than the province with the lowest mortality rate (NHFPC 2016).

Due to the low levels of financial protection provided by public health insurance, child health expenditure relies heavily on household out-of-pocket payments: only 22.1% of neonatal care costs was covered by public financing schemes (CNHDRC 2015), creating a substantial burden for families.

Meanwhile, low levels of economic and social development, of medical service provision, of health funding and, in some regions, cultural factors (mainly in central and western regions, rural areas and former revolutionary base areas), impede the implementation of some effective interventions, with negative consequences for women's and children's health (Zhao et al. 2013).

Maternal and child health are important parts of the Sustainable Development Goals (SDGs), recently formulated by the United Nations. The SDGs have put forward the target of fully eliminating preventable deaths of neonates and children under five by 2030. China is currently formulating the 13th Five-year Plan for Socio-economic Development (2016-2020), and a new goal of building a "Healthy China" was set at the fifth plenary session of the 18th CPC Central Committee (Oct. 26-29, 2015), an important component of which was maternal and child health. Given this, how to further improve maternal and child health care and promote sustainable population health will be a priority area for health system reform and development over the next five years.

Attaching great importance to high impact interventions for maternal and child health, the WHO published a Global Catalogue of Key Interventions Related to Reproductive Maternal and Child Health in 2011 and urged member states, especially low- and middle-income countries, to aggressively push for full application of these cost-effective interventions. Since 2012, UNICEF China, jointly with the National Health and Family Planning commission (NHFPC), has developed the China Child Survival Strategy (hereinafter referred to as CSS), and put forward 106 effective interventions, in line with the global catalogue and based on domestic and global evidence. Of the CSS

interventions, some are clinical diagnosis and treatment measures, some have been included in national public health programs or covered by basic medical insurance, while others relying on household out-of-pocket payments have not yet fully accepted by local communities. In view of the large number of cost-effective interventions that could be implemented, it is urgent to put forward a core package of efficient interventions, along with cost estimates, prioritize, and develop a hierarchical and stage-by-stage implementation strategy targeting key populations, so as to provide a basis for decision making regarding maternal and child health goals and priorities in the 13th Five-year Plan for Health and Family Planning.

Under these circumstances, the China National Health Development Research Center, commissioned by the UNICEF China, developed a child survival intervention package and performed cost effectiveness analyses with help of the “OneHealth Tool” (OHT), a health planning software package jointly developed by a number of international agencies including the WHO, so as to make recommendations on the priorities for use of various intervention packages and provide a basis for policy makers’ decision making on the development of maternal and child health goals and designating key tasks in the 13th Five-year Plan.

The OHT is an analysis tool jointly developed by the United Nations Population Fund (UNPF), UNICEF, and the WHO. Based on a large database of population fertility conditions in different countries collected by the UNPF, the OHT integrates health data from the WHO and all United Nations agencies, including effectiveness and cost data of key interventions in 6 areas, namely family planning, reproductive, maternal and child health, malaria, HIV/AIDS, tuberculosis and major chronic diseases (Institute F 2012).

The OHT is composed of health service modules and program- or disease-specific modules, including: child health, reproductive and maternal health, immunization, nutrition, etc. Those modules are interlinked and streamlined by a consistent approach and format. Key modules include a demographic program module (DemPro), cost calculation modules (Health service) and an effect estimation module—the lives saved tool (LiST). These modules are linked to provide combined cost effectiveness analysis of interventions

(Institute F 2012; Walker et al. 2013) DemPro is mainly used to simulate demographic changes, including total population, fertility rate and mortality changes. The Health service module is mainly used to simulate intervention costs in different health fields, including cost data of drugs / consumables / inspection for multiple default measures. Data from more than one hundred countries, including China, are covered, and the preexisting parameters (default data) of these systems are mainly obtained by the developer through evidence-based medical tools, including systemic literature reviews. The LiST module is mainly used to simulate the effects of implementation of maternal and child interventions; averted number of maternal deaths, as well as those for infants (including neonatal) and children under 5 years old are the main indicator of effectiveness (Walker et al. 2013). This LiST module was jointly developed by Johns Hopkins University, the WHO and UNICEF. More than 40 main default interventions and effect data are derived from systematic reviews of effectiveness studies of maternal and child interventions, which are regularly maintained and updated by Johns Hopkins Bloomberg School of Public Health.

The basic function of the software is to connect data from the above modules, to establish relationships between data, and to provide simulations of cost and effect for the expansion of interventions by adjusting background parameters (demography and health status, etc.), intervention cost parameters and effectiveness parameters. Coverage of a certain intervention is used a main parameter, and baseline coverage and expected coverage need to be obtained, allowing the development of simulations of changes in cost and averted deaths (Van Ekdom et al. 2011; Chola et al. 2015; McPake, et al. 2015).

OHT can be used to do cost calculation. It takes key parameters such as population at different age brackets and life expectancy as calculation basis, and conducts cost effectiveness analysis by simulating cost and effectiveness evidence. OHT is an interface-friendly health planning tool, for users are allowed to update module and data with local information input. Therefore, OHT has been successfully used for research and analysis of maternal and

child health status in many countries (Johns et al. 2007; Byrne et al. 2015; Bartlett et al. 2014; Michalow et al. 2015).

4.3.2 Methods

(1) Overall design

A four-step approach was taken by the research team:

- 1) Step 1: develop a high-impact package for the China child survival strategy (CSS) based on maternal and child (MCH) interventions recommended by the WHO, and build a computer-based calculation model using OHT for cost-effectiveness analysis of core MCH interventions.
- 2) Step 2: define parameters of the high-impact interventions package and collect data. Main parameters include population and basic mortality parameters, cost parameters and effect parameters such as averted mortality.
- 3) Step 3: estimate health gains and costs of the high-impact interventions between 2015 and 2020, and map the potential impact of implementing high impact MCH programs in China.
- 4) Step 4: discuss implications for MCH priority setting under the 13th Five-year Plan for Health, and develop possible recommendations for health decision-makers.

Expert consultations were organized to identify feasible high-impact interventions. An expert panel consisting of 28 senior experts with at least five years' experience in MCH, public health, health policies or health economic research was set up. 5 rounds of consultation meetings were convened and experts' opinions were recorded. MCH interventions in the China Child Survival Strategy (CSS) were prioritized in accordance with the WHO recommendations and evidence on effectiveness. Experts were allowed to adapt or combine interventions based on the Chinese context.

Key parameters were selected from the OHT, and reviewed and assessed by

experts during consultation meetings, including demography, health status, target population, baseline and target coverage, and costs. Most data were collected from existing sources. Where data were missing, primary data were collected from 3 provincial MCH facilities and 1 county MCH center in three western provinces chosen by the UNICEF China.

A simulation model of the 24 high-impact interventions was established using OHT software. We assumed that the 24 interventions would be launched nationwide at the same time and coverage expanded at a constant rate in the 13th Five Year Period (2016-2020), and that estimation results would be used for target- and priority-setting in national MCH policies. In the model, only direct costs at program level were included, including costs of drugs, consumables and medical tests. Personnel and health system costs were excluded. Effectiveness indicators used were maternal and child deaths averted, MMR, IMR, NMR and U5MR. The model was developed in OHT by adapting costing and effectiveness modules with updated parameters and data.

(2) Definition of high-impact interventions

A package of 24 high-impact interventions was identified using a three-step procedure:

Step 1: identifying the overlaps between the CSS interventions and the WHO Global MCH Catalogue.

Step 2: 33 interventions remained after further expert discussion. The main changes included: 4 interventions showing overlaps were merged into two⁶; 3 interventions unsuitable for the Chinese context were deleted⁷; 16 interventions with no clear evidence were deleted⁸, and 4 interventions were

⁶ The collapsed items: “safe termination of pregnancy”, “safe abortion for unintended pregnancy”, “preventive antibiotics for mothers with high risk of infection”, “use of antibiotic for preterm birth with premature rupture of membranes”.

⁷ “safe delivery, and encouragement of vaginal delivery”, “post-natal nutrition: iron, folic acid, VD, calcium, iodine, etc.”, “management of severe acute malnutrition”.

⁸ Deleted items: “prevention of unintended pregnancy”, “early screening of HIV, syphilis, and hepatitis B.”, “intervention, treatment, visiting and management of HIV, syphilis and hepatitis B patients”, “labour induction for full-term baby with premature rupture of membranes”, “timely detection of HIV, syphilis and hepatitis B status, special treatment and aid on delivery”, “treatment for postpartum haemorrhage”, “prevention of post-natal bleeding”, “antiretroviral drugs for newborns of HIV-infected mother”; “promote breast feeding”, “eliminate mixed feeding”, “antiretroviral drugs for both mother and child”, “neonatal jaundice and other critical illness identification and referral”, “preventive antiretroviral therapy for newborn exposed to HIV”, “preventive antibiotic treatment for newborn with high risk of viral infection”, “use of Continuous Positive Airway

split into 12 interventions⁹. All the changes were debated and agreed by leading experts in relevant areas.

Step 3: 24 interventions were finalized, following further consultations and scoping calculations carried out by the team¹⁰.

The 24 high-impact interventions (Table 4 - 6) make up the Chinese Child Survival Strategy high-impact interventions package. These interventions can be grouped differently based on target population, purpose of the intervention and financing source (Figure 4 - 4).

Table 4 - 6 24 interventions in the HEI package

1	Syphilis treatment & management	13	Neonatal septicemia (antibiotic injection)
2	Safe termination of pregnancy	14	Exclusive breastfeeding for infants under 6 months
3	Multi-micronutrients (folic acid, ferrum and calcium) supplementation for pregnant woman.	15	Breastfeeding and complementary feeding for infants between 6 months and 2 years
4	Oral administration of folic acid and other nutrient supplements in perinatal period	16	DPT vaccine
5	Prevention and treatment of pregnancy-induced hypertension	17	Measles vaccine
6	Prevention and treatment of abortion complications	18	HIB vaccine
7	Prevention and management of postpartum hemorrhage	19	Pneumococcal vaccine
8	Cesarean section with indications	20	Rotavirus vaccine
9	Application of antibiotics on preterm with premature rupture of membrane	21	Management of children pneumonia management (antibiotic therapy)

Pressure (CPAP) for respiratory distress syndrome in premature newborn”, “treatment of neonatal jaundice (pathological)”, “treatment of anaemia in post-natal mother”, “visit and monitor of children born to HIV or syphilis-infected mother”, “timely treatment and integrated care if infected”.

⁹ “Prevention of pregnancy complications” split into “hypertension” and “gestational diabetes”; “newborn breast feeding, umbilical cord and skin care, keep warm; VD supplement” split into “breastfeeding counselling”, and “keep warm”; “routine vaccinating” into “DPT”, “BCG”, “poliomyelitis”, “hepatitis B” and “measles”; “secondary vaccination” split into “Hib vaccine”, “PCV” and “rotavirus vaccine”

¹⁰ “Guidance for breastfeeding” combined with “exclusive breastfeeding for the first 6 months”; “keep warm” combined with “Kangaroo Mother Care”; deleted 2 interventions with no corresponding content in OHT, “local infection” and “management of premature and low birth weight infants”; and deleted 5 interventions which have been completely covered or cannot be calculated for effectiveness in population, e.g., “Polio vaccine”, “BCG”, “Hep B vaccine”, “gestational diabetes”, “Induction of labour for pregnancies lasting 41+ weeks”.

10	Neonatal resuscitation	22	Diarrhea management (oral rehydration salts)
11	Kangaroo mother care	23	Diarrhea management (zinc supplement)
12	Neonatal septicemia (fully supportive treatment)	24	Dysentery treatment with antibiotics

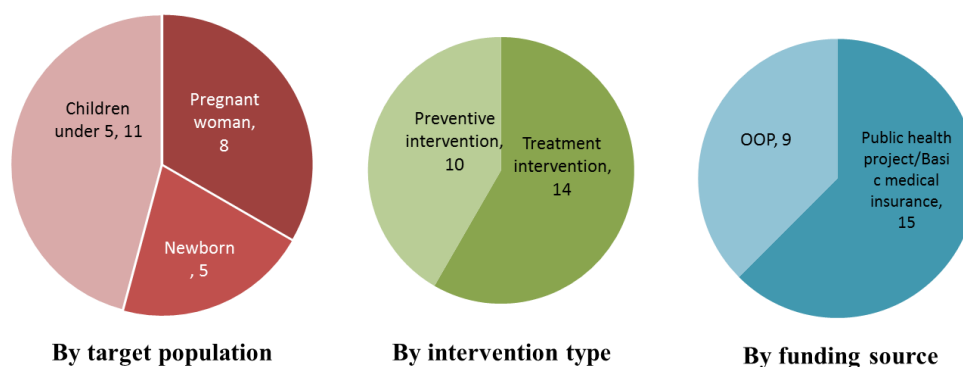


Figure 4 - 4 24 high impact interventions

(3) Data collection

Demography, health status, target population, baseline & target coverage, and cost data were collected from existing sources, including administrative data, health facility data and survey data. Primary data were collected for some missing cost data and coverage data. Survey tables were designed and distributed to pilot MCH facilities in three western provinces chosen by UNICEF China.

Demographic data on population size, fertility rate, sex ratio and life expectancy were taken from the sixth nationwide census (Table 4 - 7 and Table 4 - 8). Baseline data on health status (2015), including MMR, NMR, IMR and U5MAR were from official data released by the NHFPC in 2015 (Table 4 - 8). Remaining data were default data in the OHT11.

Table 4 - 7 Population size by different age bracket (2010)

¹¹Default data used include: vitamin deficiency, zinc deficiency, iron-deficiency anemia rate of pregnant woman, percentage of woman exposed to plasmodium, small-for-date infant percentage at birth, diarrhea incidence rate, severe pneumonia incidence rate, meningitis incidence rate, diarrhea/pneumonia/meningitis pathogenic bacteria distribution percentage, percentage of cause of neonatal / children's death, percentage of cause of maternal death, abortion rate, stillbirth rate, percentage of cause of stillbirth, and household size.

Age groups	Male	Female
0-4	41,062,566	34,470,044
5-9	38,464,665	32,416,884
10-14	40,267,277	34,641,185
15-19	51,904,830	47,984,284
20-24	64,008,573	63,403,945
25-29	50,837,038	50,176,814
30-34	49,521,822	47,616,381
35-39	60,391,104	57,634,855
40-44	63,608,678	61,145,286
45-49	53,776,418	51,818,135
50-54	40,363,234	38,389,937
55-59	41,082,938	40,229,536
60-64	29,834,426	28,832,856
65-69	20,748,471	20,364,811
70-74	16,403,453	16,568,944
75-79	11,278,859	12,573,274
80+	8,774,752	12,214,594
Total	682,329,104	650,481,765

Table 4 - 8 Main health-related indicators

Parameters	Value
Life expectancy (years)	74.8
Total fertility rate	1.18
Birth ratio	117.94
Infant mortality (‰)	8.90
Under-five child mortality (‰)	11.70
Maternal mortality (every 100,000 persons)	21.70

Data on the target population and the proportion of the target population to be covered for a certain intervention were mainly default data, though some were taken from annual MCH reports, literature and expert opinions.

Data on baseline coverage of effective interventions were mainly from annual reports of UNICEF pilots in China and default OHT data (Table 4 - 9). According to expert consensus, target coverage was set to be either 90% or 100%.

Table 4 - 9 intervention-specific indicators and data

S/N	Interventions	Target	Population	Coverag	Data source
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		populatio n	needing intervention (percentage)	e (2010)	
1	Monitoring and treatment of syphilis	Pregnant women	0-13%	68%	Report on prevention of mother-to-child transmission REPORT
2	Safe termination of pregnancy	Pregnant women	40%	92%	Expert opinion
3	Oral administration of folic acid for woman in perinatal period	Woman in perinatal period	100%	60-50%	Pilot survey of UNICEF
4	Nourishment supply to pregnant woman (ferrum, folic acid, calcium and iodine)	Maternal women	100%	69-50%	Pilot survey of UNICEF
5	Management of pregnancy-induced hypertension	Maternal women	10%	48%	Expert opinion
6	Management of abortion complications	Maternal women	0-04%	90%	Expert opinion
7	Application of antibiotics on preterm with premature rupture of membrane	Preterm	20%	52-50%	Expert opinion
8	Prevention of postpartum hemorrhage	Maternal women	24-20%	59%	Expert opinion
9	Neonatal resuscitation	Neonate	10-00%	64%	Expert opinion
10	Cesarean section on indication	Maternal women	35%	60%	Expert opinion
11	Kangaroo mother care	Neonate	10%	5%	Pilot survey of UNICEF
12	Neonatal septicemia—fully supportive therapy	Neonate	6%	37-50%	Expert opinion
13	Neonatal septicemia—antibiotic injection	Neonate	4%	40%	Expert opinion
14	Exclusive breastfeeding for the first 6 months	Infant	100%	15-00%	Expert opinion
15	Breastfeeding and complementary feeding for infant between 6 months and 2	Children and infant	100%	36-10%	Pilot survey of UNICEF

	years					
16	Immunization—measles vaccine	Children	100%	97-30%	NHSS	
17	DPT	Children	100%	92-50%	NHSS	
18	Hemophilic influenza	Children	100%	45%	Planned immunization survey report in 2012	
19	Pneumococcal vaccine	Children	100%	10%	Planned immunization survey report in 2012	
20	Rotavirus vaccine	Children	100%	24%	Planned immunization survey report in 2012	
21	Childhood pneumonia management (use of antibiotics)	Children	10%	23-67%	NHSS	
22	ORS	Children	4%	52-65%	Pilot survey of UNICEF	
23	Zn preparation (diarrhea treatment)	Children	4%	17%	Expert opinion	
24	Dysentery treatment with antibiotics	Children	4%	88-20%	Expert opinion	

The study only included direct costs of interventions, including the costs for drugs (vaccines), medical consumables and testing and detection. Altogether 41 kinds of drugs (including vaccines), 24 kinds of consumables and 11 lab tests were included based on expert consultation. Preparation and dosage information of drugs were reviewed, and collected along with prices. Drug prices were mainly from the national or provincial essential drugs list¹². Prices for medical tests and consumables at facility level were used. The costs for measles vaccine, rotavirus vaccine, oral poliomyelitis vaccine, HIB and amoxicillin used default OHT data. The price of trimoxamine was missing both in domestic datasets and default data (Table 4 - 10, Table 4 - 11, 4-12).

Table 4 - 10 Drug specification and unit price

¹²8 drugs, consumables and testing cost data were acquired from the minimum prices in survey data of the secondary and tertiary hospitals in three provinces of Guangdong, Qinghai and Guizhou.

S/N	Drugs	Specifications	Unit prices (Yuan RMB)
1	0.03mg ethinylestradiol + 0.15mg desogestrel	0.03mg ethinylestradiol and desogestrel	0.70
2	Levonorgestrel	Tablet, oral administration, 0.75mg	3.54
3	Procaine benzylpenicillin G	Powder for injection, intramuscular injection, 800,000 IU/day	0.32
4	Benzathine benzylpenicillin	Powder for injection, intramuscular injection, 2,400,000 IU	3.62
5	Erythromycin	Capsule or tablet, oral administration, 500mg	0.04
6	Lidocaine hydrochloride	(5% glucose), 2 ml, gel	1.24
7	Oxytocin	Injection, 10 IU	0.14
8	Oxytocin	Injection, 20 IU	0.28
9	Oxytocin	Injection, 2.5 IU	0.10
10	Lidocaine hydrochloride	(7.5% glucose), 2 ml	0.01
11	Misoprostol	Tablet, 200mcg	1.93
12	Mifepristone	Tablet, 25mg	2.87
13	Ferrous salt + folic acid	Tablet, 60 + 0.4 mg	0.84
14	Ampicillin for injection	500mg powder with 100-250 ml liquid	0.49
15	Gentamicin	Injection, 40 mg/ml	0.08
16	Metronidazole	Injection, 500mg metronidazole with 100 ml liquid	0.20
17	Ampicillin	Intravenous drip, 2g	1.76
18	Normal saline	Injection, 0.9%, 500ml	1.12
19	Adrenephrin	-	0.12
20	Erythromycin ointment	eye 1%, 2g	0.35
21	Hepatitis B vaccine	Yeast, 5ug/0.5ml CHO 10ug/1ml, 20ug	2.17
22	BCG	0.1ml	5.15
23	Pneumococcal vaccine	-	777
24	Oral rehydration salts	-	0.30
25	Zinc	10mg	0.02
26	Zinc	20mg	2.50
27	Dextrose saline solution	-	1.11
28	Ethyl alcohol	75%	2.53
29	Measles vaccine	0.5ml/tube	1.56
30	Rotavirus vaccine	-	10.88
31	Oral poliomyelitis vaccine (OPV)	Oral administration, one tablet	1.11

32	HIB vaccine	-	22.14
33	Iodophor	0.50%	2.2
34	Viral agent (VA)	-	0.54
	Prostaglandin		
35	(misoprostol or carboprost)	Oral administration or anus administration, 200mg*1, 1mg*1	1.55
36	Penicillin with enzyme inhibitor	Intravenous drip, 50mg/kg	9.8
37	Second-generation cephalosporins	Intravenous drip, 25mg/kg	1.05
38	DPT vaccine	0.5ml	3.4
39	Amoxicillin	Syrup, 15ml	0.15
40	Trimoxamine	Syrup, 7.5ml	-
41	Atropine	Intramuscular injection, 1mg	0.35

Table 4 - 11 Consumables and unit price

S/N	Consumables	Unit prices (Yuan RMB)
1	Female condom	0.35
2	Male condom	0.35
3	Blood sampling package (blood taking needle, blood collection tube, cotton swab, isolation pad, disposable glove and sterile adhesive tape)	1.3
4	Injection package (injector, water for injection, cotton swab and needle)	1.5
5	Urine specimen container	0.28
6	Operating package (soap, plastic cloth, blade, umbilical tape/coil, cotton ball and 10 pieces of gauze)	32
7	Operating package + dressing packet (soap, plastic cloth, blade, umbilical tape/coil, cotton ball and 10 pieces of gauze)	32
8	Infusion package (infusion apparatus, infusion sterile adhesive tape, cotton swab and needle)	0.09
9	Neonatal recovery package (mask and resuscitator bag)	45
10	Tracheal intubation or laryngeal mask airway (200-300 yuan/piece)	14.5
11	Low small bladders	800
12	IV indwelling/ perfusion group, needle	7
13	0.5ml, disposable syringe with needle	0.35
14	Safe storage box for deprecated syringe needle (5L)	4.9
15	Disposable latex glove (pair)	0.58
16	Partogram	0.5
17	Central oxygen supply for 1h	3

18	Umbilical cord and skin care package (ethanol for disinfection, aseptic cotton swab, gauze and bath)	3-5
19	1000L oxygen, including oxygen cylinder	980
20	Nutrition package for pregnant women	6-08
21	Supply of drugs/materials for a case of kangaroo mother care	37-8
22	Supply of drugs/materials for a case of inducing abortion	308-5
23	Supply of drugs/sanitary products for a case of breastfeeding promotion	5
24	Supply of drugs/sanitary products for a case of complementary feeding promotion and education	5

Table 4 - 12 Test items and unit price

S/N	Description for testing/detection	Unit price (Yuan RMB)
1	Urine albumen test	8
2	Liver function test	64
3	Rapid quantitative test	8
4	Rapid test with trace glucometer	5
5	Laboratory testing of glycosylated hemoglobin	45
6	Laboratory testing of urine acetone bodies	1
7	Routine blood test	20
8	Blood culture	70
9	Chest X-ray	60
10	Monitoring of blood pressure	5
11	C reactive protein determination	18

(4) Model development

The effect of implementing the high-impact interventions package (Relative Risks) was estimated in terms of annual maternal and child deaths averted (2015-2020), and expressed by 4 mortality rates: MMR, NMR, IMR, and U5MR. The DemPro module was employed to calculate annual deaths by age group as well as yearly MMR, NMR, IMR, and U5MR. The LiST module was used to estimate the number of deaths averted by implementing individual interventions. The health service module was used to calculate the annual costs of individual measures from 2015 to 2020. Calculations were as follows:

- (1) Annual budget for an intervention = unit cost of the intervention * number of target population to be intervened * coverage rate
- (2) Unit cost of intervention = (drug * quantity * unit price) + (consumable* quantity * unit price) + (testing* quantity * unit price)
- (3) Number of target population to be intervened = whole population * proportion of target population * proportion of target population to be intervened

Cost-effectiveness ratio (CER) of each intervention between 2015 and 2020 was calculated and expressed as the cost per death averted. The lower the CER of an intervention, the more cost-effective the intervention. The formula was defined as:

$$\text{CER} = \text{total cost of the intervention} / \text{total deaths averted}$$

Scenario mapping was done to estimate the impact and costs of different combinations of interventions.

4.3.3 Results

(1) Estimated effect of the high-impact interventions

Neonatal mortality, infant mortality and mortality of children under 5 years old would decrease due to the expansion of the 24 interventions, reaching 5.39‰, 6.21‰ and 8.26‰ respectively by the end of 2020 (a reduction of 30%, 30.2%, and 29.4%). This equates to saving the lives of 79,000 neonates and 126,000 children under 5 years (Figure 4 - 5).

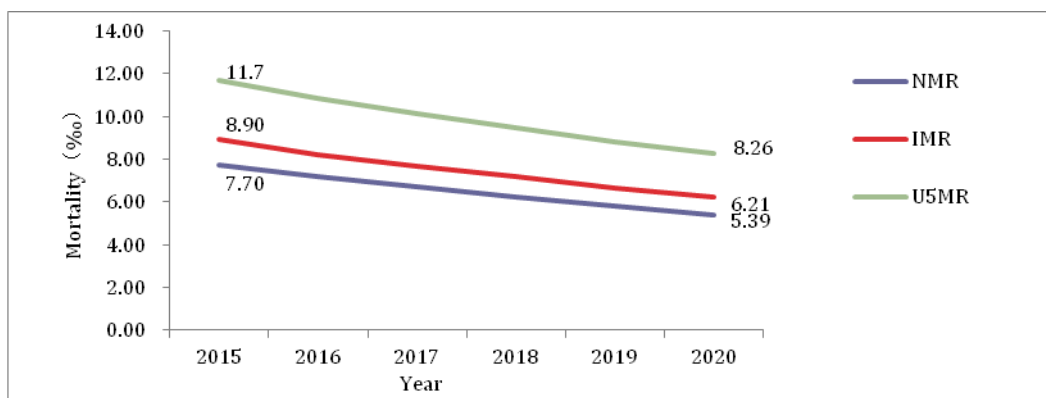


Figure 4 - 5 Child mortality rate: 2015 - 2020

Maternal mortality would decrease with expansion of the 24 interventions in the next five years, to 13.67/100,000 by 2020 (37.0% reduction). This equates to saving the lives of 2,815 pregnant women (Figure 4-6).

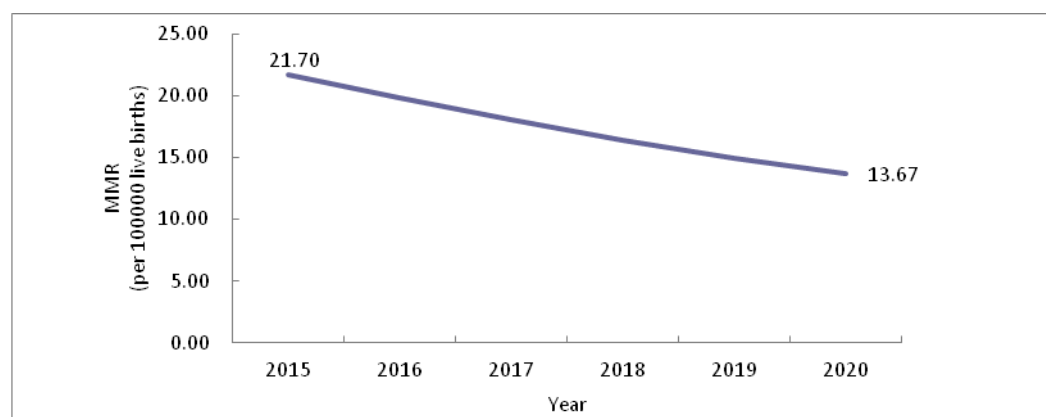


Figure 4 - 6 Maternal mortality rate: 2015 – 2020

(2) Estimated effects of interventions by source of finance

15 interventions are included in the basic public health packages subsidized by public finance or included in the benefit packages of publicly-financed medical insurance schemes, and 9 interventions are paid by out-of-pocket (OOP) payment. According to our analysis, these two intervention bundles would have different effects (Figure 4 - 7): interventions relying on OOP would save 48,285 lives (37.6% of total lives saved), while publicly-financed interventions would save 86,255 lives (67.17% of total lives saved)(see Table 4 - 13, Table 4 - 14). The average cost of privately financed interventions is 4,296.60 Yuan RMB, about 37.62% of per capita disposable income in rural

China in 2015¹³. At the moment, majority of target populations of these interventions are living in less developed western provinces in China. Privately financed interventions would likely create problems for expansion of coverage, and have impact on actual effectiveness in these areas.

Table 4 - 13 Effects of different intervention packages

Interventions	NMR	IMR	U5MR	MMR
9 interventions relying on OOP	8.3	10.1	11.2	1.2
15 publicly financed interventions	19.5	20.0	19.8	35.7
24 interventions	30.0	30.2	29.4	37.0

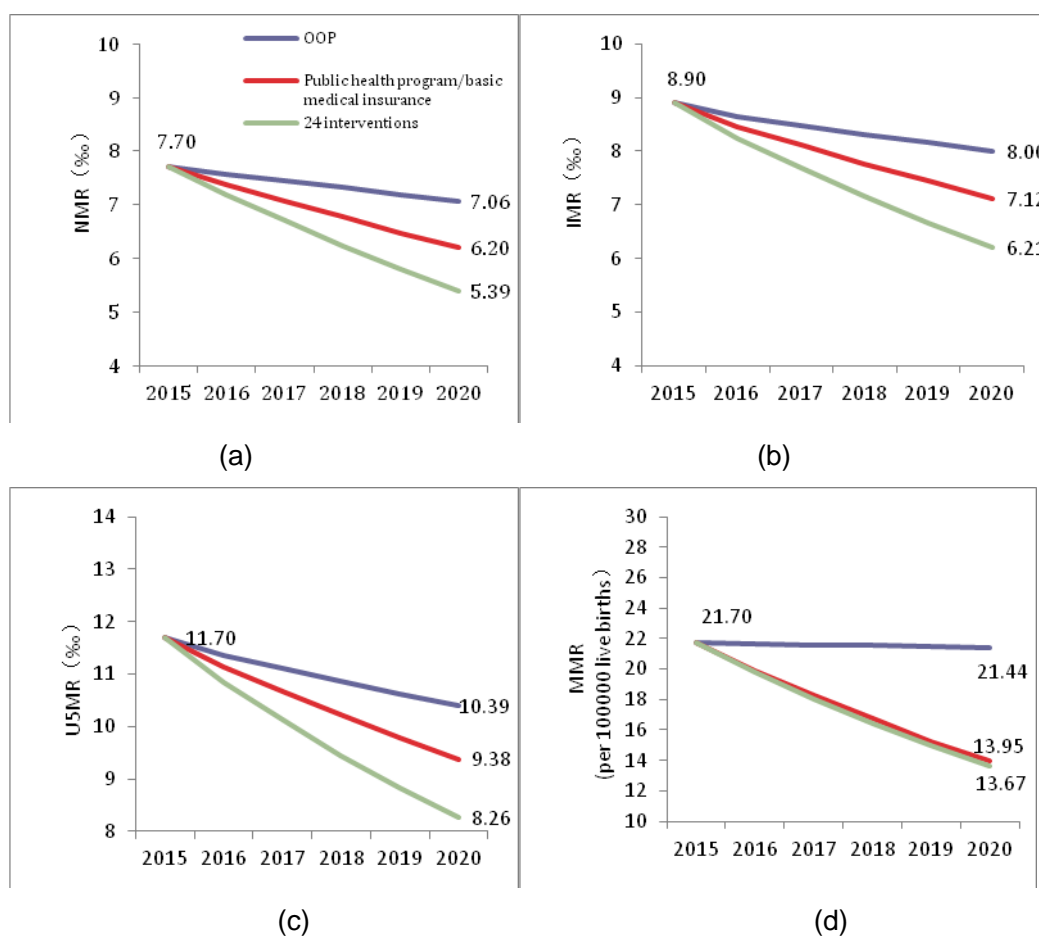


Figure 4 - 7 Effect of interventions by financing source: 2015 - 2020

Table 4 - 14 Maternal and child deaths averted

¹³The per capita disposable income of 2015 was 11421.71. The data was withdrawn from the database of the Chinese Statistics Bureau. <http://data.stats.gov.cn/easyquery.htm?cn=C01>.

Interventions	Deaths averted	Children under5	Children 1-59 months	1-59 Infants 1 month	under Maternal deaths averted
9 interventions relying on OOP	48285	48199	27166	21034	86
15 publicly financed interventions	86255	83578	33080	50499	2677
Total: 24 interventions	128421	136373	46629	78976	2815

(3) Cost-effectiveness analysis

The 10 most effective interventions were identified based on total lives saved between 2015 and 2020 (Figure 4 - 8). Cesarean section on indication ranks no. 1, with 34,000 lives saved. The 10 most effective interventions have the potential to save 105,000 lives, 91% of the total number of lives saved by the whole package of 24 interventions.

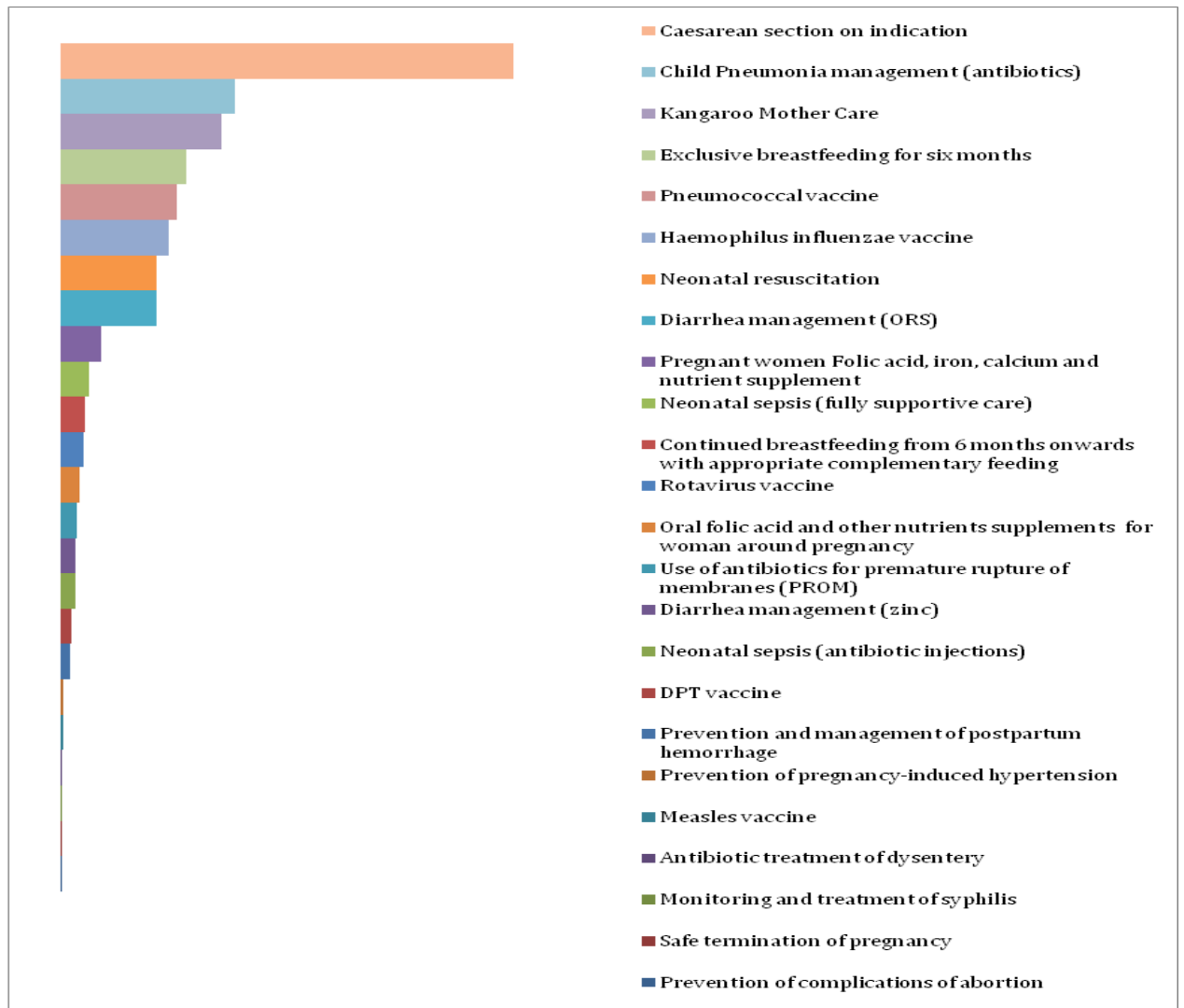


Figure 4 - 8 Effectiveness ranking of the 24 interventions

The direct costs of the 24 interventions will increase along the years, reaching 123.9 billion Yuan RMB in total (Figure 4 - 9). Analyzed by target population, 69% of total costs are for interventions targeting children under 5, 30% for maternal interventions and 1% for neonatal interventions. Analyzed by intervention type, only 4% of costs go on curative interventions, with the rest going to preventive measures, with pneumococcal vaccine for children under 5 being the most prominent driver of costs, at 62% of the total cost. Analyzed by funding source, 7% of the cost of interventions are covered by public finances, while the remainder is covered by private payments (largely out-of-pocket payment).

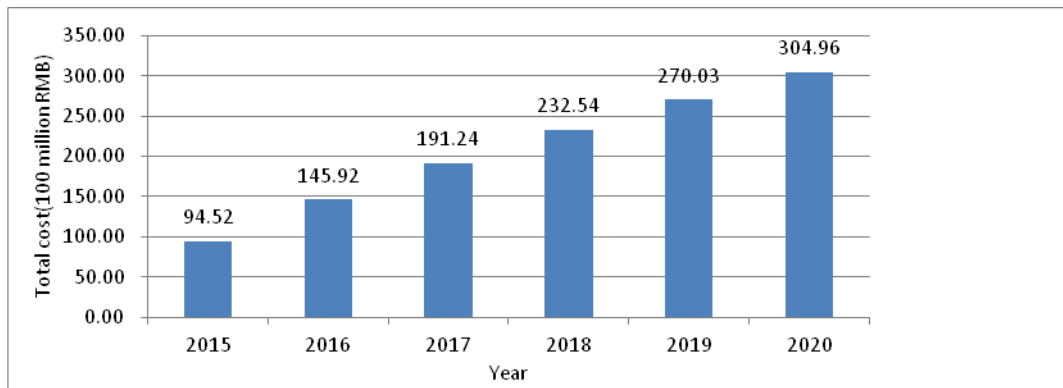


Figure 4 - 9 Direct costs of high impact interventions: 2015 - 2020

The top 10 cost-effective interventions were identified based on cost per death averted or life saved, and can be grouped differently, by target population, by the purpose of the intervention or by financing source (Figure 4-10).

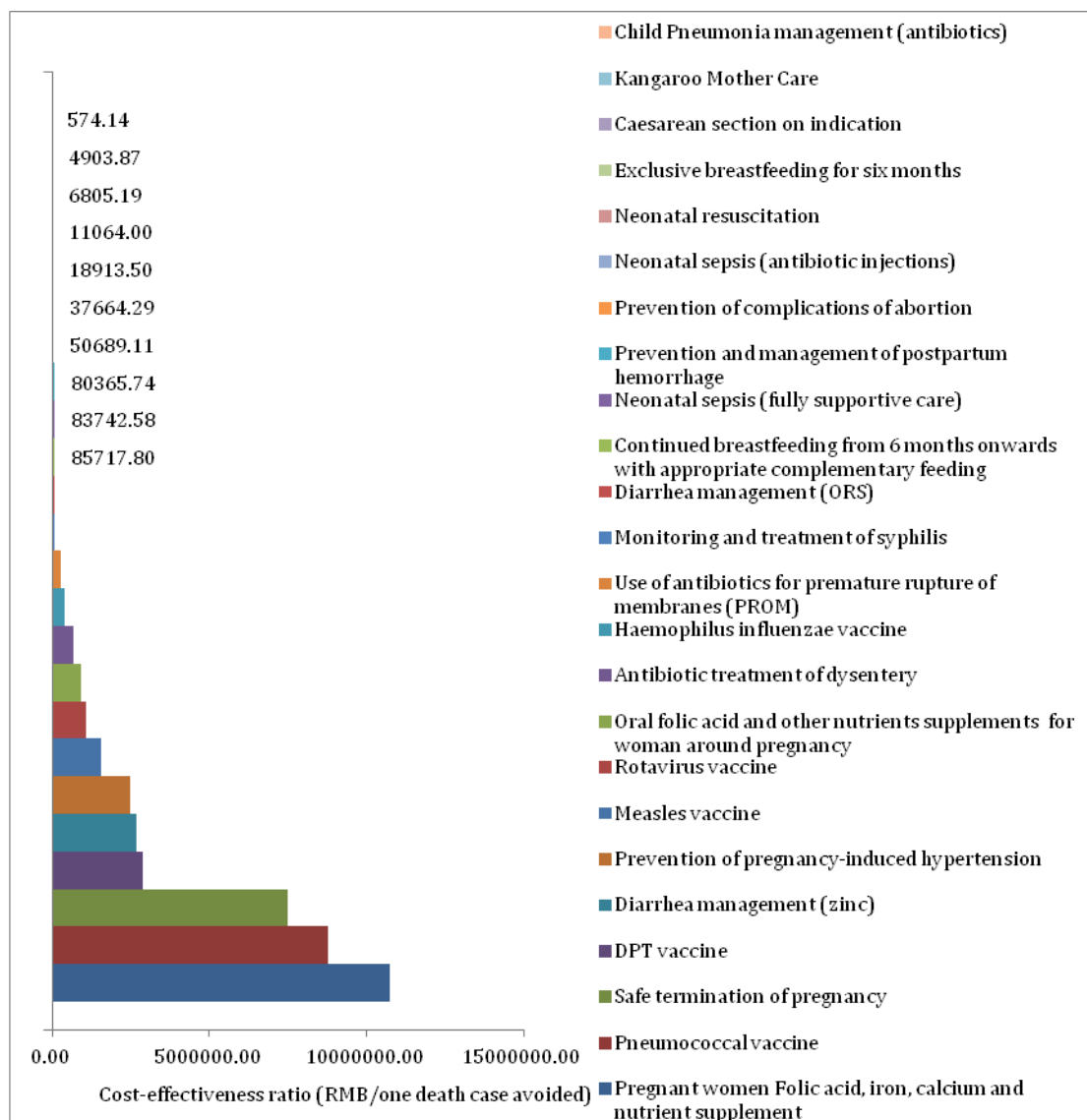


Figure 4 - 10 Cost-effectiveness ratio of 24 interventions

The top 10 cost-effective and effective interventions are displayed in Table 4 - 15, of which the 6 marked in red are the most effective and cost-effective. Scenario mapping based on stratified analysis was done to show the costs and impacts of different choices of interventions (Figure 4 - 10).

Scenario 1: The impact of the 6 most effective and cost-effective interventions¹⁴ accounted for 69.59% of the total impact, expressed in percentage of lives saved of the total, but the cost of these interventions was only 0.58% of total cost (Table 4-16).

Scenario 2: Adding 4 cost-effective interventions to the top 6 measures with the highest impact could help save 13,500 lives,¹⁵ but would require an additional investment of 264 million Yuan RMB, with an average cost of 20,000 Yuan RMB per life saved (Table 4-15).

Scenario 3: Adding another 4 effective interventions¹⁶ to the top 10 most cost-effective interventions could further save 13,500 lives, but with an additional investment of 113.2 billion RMB, the average cost of the 14 effective interventions is 8.38 million Yuan RMB per life saved. Pneumococcal vaccine is the main driver of mortality reduction and increased costs (Table 4 - 16).

As shown in Table 4 - 17, Maternal mortality is largely influenced by the top 4 cost-effective interventions, while the mortality of children under 5 is most influenced by the pneumococcus vaccine program.

Table 4 - 15 Top 10 cost-effective interventions and top 10 effective interventions

Top 10 cost-effective interventions	Top 10 effective interventions
<i>Childhood pneumonia management (use of antibiotics)</i>	<i>Indicative caesarean section</i>

¹⁴ 6 interventions are children pneumonia management (use of antibiotics), caesarean section, kangaroo mother care, exclusive breastfeeding for infants under 6 months, neonatal resuscitation and neonatal septicaemia-fully supportive therapy

¹⁵ The four interventions are neonatal septicemia-antibiotic injection, management of abortion complications, prevention of postpartum hemorrhage and continuous exclusive breastfeeding plus complementary feeding for infants between 6 months and 2 years.

¹⁶ The four interventions are pneumococcal vaccine, Haemophilus influenza B, diarrhoea management of oral rehydration salts and nutrition package for pregnant women

<i>Kangaroo mother care</i>	<i>Childhood pneumonia management (use of antibiotics)</i>
<i>Indicative caesarean section</i>	<i>Kangaroo mother care</i>
<i>Exclusive breastfeeding for the first 6 months</i>	<i>Exclusive breastfeeding for the first 6 months</i>
<i>Neonatal resuscitation</i>	Pneumococcal vaccine
Neonatal septicemia—antibiotic injection	Haemophilus influenza B
Prevention and treatment of abortion complications	Diarrhea management (oral rehydration salts)
Prevention and management of postpartum hemorrhage	<i>Neonatal resuscitation</i>
<i>Neonatal septicemia—fully supportive therapy</i>	Nutrition package for pregnant women
Continuous exclusive breastfeeding plus complementary feeding for infants between 6 months and 2 years	<i>Neonatal septicemia—fully supportive therapy</i>

Table 4 - 16 Costs and averted deaths of different stratified packages

Scenarios	Cost (100 million)	Investment to be added (100 million)	Share of cost (%)	Deaths averted (10,000)	Share of effectiveness (%)
6 interventions	7.13	1.64	0.58	8.93	69.59
10 interventions	9.77	3.30	0.79	10.28	80.04
14 interventions	1141.56	1128.88	92.12	11.63	90.54
24 interventions	1239.21	1148.35	100.00	12.84	100.00

Table 4 - 17 Stratified mortality of different intervention package

Effectiveness	6 interventions	10 interventions	14 interventions	24 interventions
Maternal mortality (per 100,000)	17.62	15.9	15.81	14.61
Neonatal mortality (%)	5.86	5.83	5.73	5.39
Infant mortality (%)	6.89	6.86	6.64	6.28
Under-five child mortality (‰)	9.48	9.44	8.87	8.47

(4) Price adjustment of pneumococcal vaccine

According to data released by the WHO, half of all severe cases of child pneumonia were caused by pneumococcal bacteria. Accordingly, use of pneumonia vaccine for children under 5 is strongly recommended. For children under 2, there are 7-, 10-, and 13-Valent pneumococcal vaccines manufactured by multinational pharmaceutical companies, targeting different bacteria and sold for different prices. At present, China has only approved sales of Prevenar (Pneumococcal 7-Valent Conjugate Vaccine), and not the widely-used 13-Valent vaccine. Not covered by the national program of planned immunization, Prevenar products have been provided to children under five and their families at their own expense. For children between 2 and 5, 23-Valent pneumococcal vaccine can be a choice. In China, 23-Valent vaccines are produced by local pharmaceutical companies, and sold at 186 Yuan RMB per dose (26.57 USD), while international products are also available at a higher price (286 Yuan RMB, or 40.86 USD). At the moment, among families with babies under 2 years, only a few can afford the 7-Valent vaccine and some families chose to go to Hong Kong for the 13-Valent vaccine. For families with babies of 2-5 years, only a few will have their babies inoculated with 23-Valent vaccine, given that the intervention is neither covered by the national planned immunization program, nor reimbursed by the national health insurance schemes.

In our study, pneumococcal vaccine is the most prominent cost driver for the high-impact package and the greatest contributor to reduction of U5MR in China. Analysis of the cause of the high costs of this vaccination program found that the cost of Prevenar was very high, at nearly 777 Yuan RMB per dose, 35 times the price of 13-Valent pneumococcal vaccine quoted by the GAVI Alliance, of 3.3 USD per dose (GAVI 2013). 4 doses are required for complete inoculation of 7-Valent pneumococcal vaccine, and the target group for this vaccination is very large. If this were to be funded by Chinese government, the cost would be astronomical.

If the Chinese government plans to fully or partially fund a pneumococcal vaccine program, it would need to consider how costs could be reduced. We

carried out a quick estimate of costs based on the assumptions that 7-Valent and 13-Valent pneumococcal vaccines are equally effective for immunizing children under 2 years and that 13 and 23-Valent vaccine are equally effective for children between 2 and 5 years.

According to our estimate, with price reduction, the total costs of the whole intervention package for 2015 to 2020 would decrease by 60%– a saving of 74.6 billion Yuan RMB, based on the price quoted by the GAVI Alliance (Table 4 - 18). As a result, the cost-effectiveness ranking of the pneumococcal vaccine intervention would move up from the 23rd place in the whole intervention package to 13th place.

Table 4 - 18 Pneumococcal vaccine price and its impact on the total costs of the intervention package

Packages	Total costs (100 million Yuan)	Additional investment (100 million Yuan)	Share of costs (%)	Share of Averted deaths (10,000)	Share of effectiveness (%)
6 interventions	7.13	1.64	0.58	8.93	69.59
10 interventions	9.77	3.30	0.79	10.28	80.04
14 interventions (13-Valent vaccine)	395.52	382.85	31.92	11.63	90.54
14 interventions (7-Valent vaccine)	1,141.56	1,128.88	92.12	11.63	90.54
24 interventions (13-Valent vaccine)	493.17	402.32	39.80	12.84	100.00
24 interventions (7-Valent vaccine)	1,239.21	1,148.35	100.00	12.84	100.00

2.2.4 Conclusions

This study analyzed costs and effectiveness of a number of high-impact interventions in the Chinese context by developing a model through using the One-Health Tool (OHT) and local data inputs. The total costs and effectiveness of the core interventions from 2015 to 2020 were estimated by

using the OHT, and related findings have contributed to the establishment of the Maternal and Child Health Plan in China's 13th Five-Year Plan.

The China Child Survival Strategy (CSS) includes 44 cost-effective interventions recommended by the WHO, of which 24 have been implemented in China. If these interventions can be comprehensively popularized and implemented in China under the 13th Five-Year Plan for Health, this would translate into a significant reduction in both maternal and child mortality. Under this scenario, by the end of 2020 MMR would decrease to 13.67 per 100,000 live births, and NMR, IMR and U5MR would decrease to 5.39 per 1,000 live births, 6.21 per 1,000 live births and 8.26 per 1,000 live births, respectively. This would equate to a reduction in deaths of neonates and children under 5 of 79,000 and 126,000, respectively.

The total cost of implementation of all 24 measures over the next 5 years would be 123.9 billion RMB. Of this, the cost of pneumococcal vaccines would be 76.9 billion RMB, the primary reason for the whole intervention being high cost.

During the next 10-15 years, the goal of China's health system reform efforts is to increase health benefits at minimum cost. Based on the analysis presented in this study, it is strongly recommended that efficient child survival interventions be fully implemented in China. The 24 efficient interventions discussed here should be implemented in a step by step manner, based on their effectiveness and cost-effectiveness and the availability of public funds.

Tier 1: The top 6 most effective and cost-effective interventions should be comprehensively implemented, including indicative cesarean section, neonatal resuscitation, childhood pneumonia treatment (use of antibiotics), exclusive breastfeeding for infants under 6 months and kangaroo mother care. The top 4 measures have already been rolled out in China and have been included in China's medical insurance program. However, exclusive breastfeeding for infants under 6 months and kangaroo mother care are both effective and cost-effective, but have only been implemented in a limited way. As the study results show, these two interventions have significant impact on neonatal health. We believe they should receive more attention in China and

that they should be included in the National Maternal and Child Health Action Plan. Overall, the total cost of implementing these 6 interventions as a publicly-financed package nationwide would be 713 million Yuan RMB, of which 164 million Yuan RMB would be required to implement these two supplementary measures. Overall, we calculate that implementation of the top 6 interventions would reduce MMR, IMR and U5MR to 17.62 per 100,000 live births, 6.89 per 1,000 live births, and 9.48 per 1,000 live births, respectively, by 2020.

Tier 2: Based on implementation of the 6 core interventions above, we suggest that the next step should be to implement the other 4 cost-effective interventions identified, including management of abortion complications, prevention and management of postpartum hemorrhage, management of neonatal septicemia (antibiotic injection), continuous exclusive breastfeeding plus complementary feeding for infants between 6 months and 2 years. Coverage of 3 interventions has been widely expanded in second-tier and higher hospitals and covered by China's basic medical insurance schemes. However, continuous breastfeeding has seen only limited implementation. We suggest that it be included in China's basic public health packages as a way to achieve greater population coverage. The total implementation cost of the 10 efficient interventions discussed here is expected to be 977 million RMB. The supplementary cost of the new 4 measures would be 330 million RMB. We estimate that maternal mortality would decline to 15.9 per 100,000 live births, IMR to 6.86 per 1,000 live births, and U5MR to 9.44 per 1,000 live births by the end of 2020.

Tier 3: Based on the 10 efficient interventions given above, we recommend the addition of another 4 effective interventions, including diarrhea management (oral rehydration salts), pneumococcal vaccine, Haemophilus influenza B, and use of a nutrition package (ferrum, folic acid, calcium, etc.) for pregnant women. These could be very beneficial for maternal and child health, especially for reducing U5MR. The overall cost of implementing these 14 interventions is expected to be about 11.4 billion RMB. According to our calculations, by the end of 2020, maternal mortality would decline to 15.81 per 100,000 live births, IMR to 6.64 per 1,000 live births, and U5MR to 8.87 per

1,000 live births. The high cost of pneumococcal vaccines (770 RMB per dose), results in the high cost of this package of interventions. Given this, we recommend that Chinese government include pneumococcal vaccine and Haemophilus influenza B in the expanded planned immunization program, and reduce the price of these vaccines to improve the cost effectiveness of the intervention package. If the cost of pneumococcal vaccines can be lowered to be in line with suggested price from GAVI (22 Yuan RMB), we estimate that this would result in a cost saving of about 74.6 billion Yuan RMB for this service package. In addition, the domestic and international prices of oral rehydration salts and influenza vaccines also diverge substantially, and we suggest that these be included in China's uniformly drug procurement system so as to bring down the costs of the interventions discussed here.

Overall, maternal and child health could be greatly improved through a hierarchical stepwise implementation of efficient child survival interventions. This would ensure effective use of China's budget in improving service accessibility and effectiveness. The recommendations put forward by this study provide a basis for decision making by the Government of China to set national maternal and child health goals, and more rationally allocate health resources in the 13th Five-Year Plan for Health. But we notice that 9 effective interventions are still privately financed, coverage of these interventions in rural areas of western provinces is very likely to be affected by low affordability of local target population. As a result, we strongly recommend the local and national government consider inclusion of these interventions in the benefit packages of basic health insurance schemes or essential service list of public health packages, to make the services more assessable to poor and vulnerable groups in rural areas of western provinces in China.

The OneHealth Tool has been applied in more than 25 countries (mostly sub-Saharan Africa). While most applications look at resource needs for the entire health sector across programs and system components, the tool is used in China to look at MCH-specific program activity costs. We found it a user-friendly tool and ready to be defined in accordance with local context. However, the accuracy of cost and effectiveness projection results depends on availability of data, close engagement of key experts and actors, and

carefulness of the users.

At the time of submission of the paper, findings of the study were used as evidences for defining the maternal and child health targets in the 13th Five-Year Plan for Health and Healthy China 2030 Plan as well. The authors have been commissioned by the National Health and Family Planning Commission and UNICEF China to work on pilot programs on the high-impact child survival interventions in 17 counties of 4 western provinces in China. The extensive pilot program will definitely validate and strengthen the current study, as well as testify the use of OHT in the Chinese setting.

4.4 Situational analysis of the Safe Newborn Project

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Abstract

Background. During the 13th Five Year Plan Period (2016-2020), the Chinese government has planned to implement early essential neonatal care (EENC) as a response to the call in the Every Newborn Action Plan (ENAP) launched by the World Health Organization (WHO) and UNICEF in 2016. In the end of 2017, a nationwide pilot program was started in 20 rural counties in 4 western provinces with the support of UNICEF, covering a population of 6.3 million. The China National Health Development Research Center (CNHDRC), a national think-tank for health policy research and knowledge translation, was commissioned to conduct situational analysis and baseline studies for monitoring and evaluation (M & E) in 2017.

Goal. The situational analysis and baseline studies aimed to better understand the geographic, economic, social, demographic and cultural background of the ENAP pilot sites, and to gather and assemble evidence for priority-setting decisions and implementation planning of local maternal, child and neonatal care delivery services in these pilot counties and provinces.

Methods. Mixed methods were employed in the studies. In addition to administrative and institutional data collected from pilot sites, a questionnaire survey was designed and delivered mainly based on ENAP bottleneck analysis tool, to understand the disease burden, existing resources and input

level, service capacity, and barriers to scaling up essential neonatal care interventions in these poor counties. Costing and cost-effectiveness analysis were conducted using the One Health Tool to map the potential health gains and investment gaps. Focus group discussions and in-depth interviews with key stakeholders such as local politicians, health administrators, hospital managers, clinicians, and patients and their families in the pilot counties and provinces were conducted, to gather information on perceptions of and attitudes to ENAP.

Results. The implementation of essential neonatal interventions is in line with local maternal and child health policies and plans, and welcomed by most stakeholders. ENAP could make huge impact on MCNC in the pilot sites, with deaths of 133 mothers, 1,860 newborns and 2,007 children under five averted by 2020. A total additional investment of 343 million Yuan RMB would be needed for the next 4 years (2017-2020), to cover annual live births of 82,586 babies in 4 provinces with a full package of 14 essential neonatal care. However, implementation of the pilot program will face some common bottlenecks in these sites, including poor project management capacity, lack of clinical skills and competence, inadequate coverage of essential drugs and basic procedures, and low awareness and knowledge of MCNC.

Conclusions. A comprehensive strategy for implementing the essential package of neonatal care should be developed by each pilot site, with full consideration of the current situation including local needs, existing resources and care delivery modes, as well as future potential, including potential cost and health gains, and sources of financing to meet the funding gap.

Key words: early essential neonatal care (EENC); priority-setting; situational analysis; implementation planning

4.4.1 Introduction

Newborn deaths account for 44% of deaths of children under five years of age (New 2014). Studies have shown two thirds of newborn deaths can be prevented with cost-effective interventions, most of which only require simple and least costly technology, and can be effectively provided by a skillful birth

attendant, such as keeping warm, immediate contact of newborn and mother, and exclusive breastfeeding for babies under 6 months (WHO 2010; 2015). Attaching great importance to high impact interventions for maternal and child health, the WHO published a Global Catalogue of Key Interventions Related to Reproductive Maternal and Child Health in 2011 and urged member states, especially low- and middle-income countries, to aggressively push for full application of these cost-effective interventions.

The Sustainable Development Goals (SDGs) call for action to eliminate preventable deaths of newborns and children under 5 years of age, and kindle enthusiasm among global partners. Promoted by UNICEF and WHO, a global action plan called Every Newborn: an Action plan to end preventable deaths (ENAP) was passed at the Sixty-seventh World Health Assembly in 2014 (WHO & UNICEF 2014). It asserts the importance of scale up cost-effective interventions and quality care around the time of birth and for sick and small newborns. As estimated, lives of nearly 3 million newborns and women every year at an additional cost of US\$ 1.15 per person in 75 high burden countries, such as China (New 2014; WHO 2015).

In recent decades, the Chinese government has invested heavily in strengthening maternal and child health delivery system, especially since the launch of radical health reforms in 2009. Health infrastructures have been improved, hundreds and thousands of midwives and obstetricians trained, and free essential public health services for women and children implemented. As a result, there have been significant maternal child health (MCH) improvements in the past decades in China, meeting Millennium Development Goals (MDGs) of reducing child mortality rates and improving maternal health: under five mortality rate (U5MR) is 10.7‰ in 2015 compared to 54‰ two decades ago; infant mortality rate (IMR) has also decreased from 42‰ in 1990 to 8.1‰ in 2015. Maternal mortality rate (MMR) in 2015 was 20.1 per 100,000, showing a decrease of 80% from 2000.

Despite the progress, health gaps between urban and rural areas still remain a big challenge in the country. An estimated 25% of Chinese children live in

poverty-affected areas.

75% of maternal and child deaths are due to the preventable and curable reasons and illnesses. Due to limited health financial protection, child health financing mainly relies on household out-of-pocket payment (OOP), and over 40% of child health expenditure are financed by out of pocket payment (CNHDRC 2016). Meanwhile in some areas (particularly the poor, ethnic minority, remote and underdeveloped areas in western regions), some effective interventions are still hard to implemented fully due to limited economic and social development, poor health delivery capacity, restrictions on health financial protection and cultural barriers.

These poorest and most vulnerable children, whether migrants or ethnic minorities, are in remote and rural areas of western provinces in China and suffer deprivation on multiple dimensions. The average infant mortality rate (IMR) in rural areas is 1.97 times that of the average urban IMR, and the under-five mortality rate (U5MR) is 2.41 times higher in the rural areas than its urban counterpart. In addition to the urban-rural disparities, provincial and regional disparities also exist. Most western provinces has seen slower progress with maternal and child health improvement as compared to the central and eastern regions, failing to meet the national targets and MDGs. When assessing by provinces and municipalities, U5MR in Tibet or rural areas in Sichuan, Guizhou, Qinghai and Ningxia was 7 or 8 times lower than in developed municipalities such as Beijing and Shanghai (CNHDRC 2013).

China's newborn deaths accounted for 51.3% of the U5MR in 2014 (NHFPC 2016). As a country with one of the largest absolute number of newborn deaths, the national government has committed to reducing preventable newborn deaths. From 2000 to 2015, although China's neonatal mortality rate decreased by 9.2% annually, accounting for a smaller share in total U5 deaths, yet the share of newborn deaths remained high at 66.9%, which was higher than the world average for the year. Therefore, China was listed as one of the 35 priority countries for interventions whose share of newborn deaths in children under five was above 40%.

4.4.2 SNP project and the design

(1) Overview

Safe Newborn Project (SNP) (2016 – 2020), is a large-scale trial of county-level scaling up of high impact interventions targeted to saving newborns' lives. Designed jointly by the NHFPC and UNICEF (Figure 4 - 11), the project will implement pre-identified high impact interventions (7 core ones and 7 optional ones) (Table 4 - 19) in selected high burden counties in 4 western provinces, namely Ningxia, Guizhou, Qinghai, and Sichuan Province. 20 counties with the highest MCH mortality and morbidity were selected after consultations among the provincial and national policy-makers. These counties are all poverty-stricken, and predominantly inhabited by people from China's 55 recognised ethnic minority groups.

A total population of 6.3 million, including 1.61 million women of child-bearing age, 68,000 newborn and 458,769 children aged under five will be covered by the pilot. Because of regional variations in terms of health problems, stakeholders, resources, and policies, it is not practical to design and implement a uniform plan across all localities. Local pilot sites are encouraged to spearhead with innovations and explore their own pathways to providing quality essential newborn care to the target population.

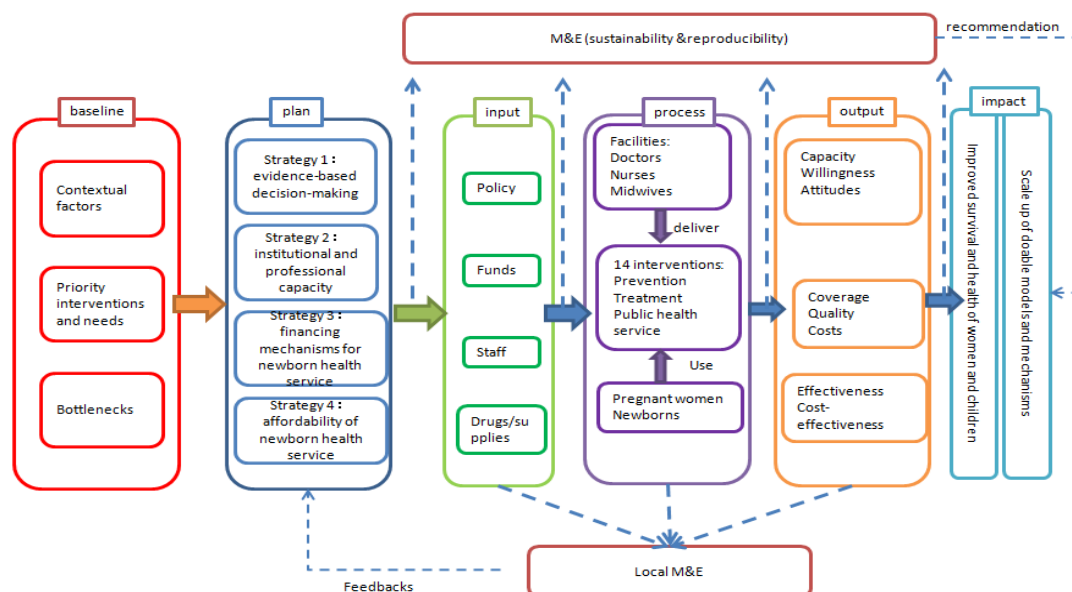


Figure 4 - 11 Programme theory

Table 4 - 19 High impact interventions

	Interventions	Target population
1	Active management of the 3rd stage of labor*	pregnant woman
2	Neonatal resuscitation*	newborn
3	Kangaroo mother care*	newborn
4	Breastfeeding counseling and support*	infant
5	Syphilis detection and treatment	pregnant woman
6	Hypertension disorder case management	pregnant woman
7	Daily iron and folic acid supplementation	pregnant woman
8	Labor and delivery management	pregnant woman
9	All breathing newborns receive immediate skin-to-skin contact for at least 90 minutes*	newborn
10	Newborn eye prophylaxis (erythromycin ointment or 2.5% povidone iodine eye drops*	newborn
11	Newborn muscle injection of Vitamin K*	newborn
12	delayed umbilical cord clamping*	newborn
13	Antibiotics for pPRoM	newborn
14	Neonatal sepsis - diagnosis and treatment	newborn

The most distinguishing feature of the pilot is its focus on contextualized evidence delivery. As one of the five main task components, evidence-informed decision making is stressed to support local program planning and decision-making. A plan for situational analysis has been developed and issued to pilot areas after negotiations among the central

health policy-makers (officials from the Department of Maternal and Child Health, National Health Commission), the funder (Child Care Division of the UNICEF China Office), and the research team of a national think-tank (China National Health Development Research Center).

(2) Design

To establish the current situation with regards to key contextual factors, local health delivery systems, barriers and opportunities for the pilot program, a situational analysis of the pilot sites was conducted. It was designed as a 4-step study (Figure 4 - 12).

Step 1: Study designing and tools development

Situational analysis was informed mainly by the ENAP bottleneck analysis tool (Mosley & Chen 1984) and OneHealth Tool (OHT) (Marsh et al. 2013; OneHealth Manual 2012). Given the complexity of healthcare delivery (Mutale et al. 2013) and non-health and health factors (Feng et al. 2012), a framework based on 6 building blocks was constructed (Murray & Frenk 2000; WHO 2000).

Step 2: Data collection

Administrative and institutional data were collected from pilot sites to understand the current situation. A questionnaire survey was designed and delivered mainly based on the ENAP bottleneck analysis tool, to understand the disease burden, existing resources and input level, service capacity, and barriers to scaling up essential neonatal care interventions in these poor counties. Based on the parameters in the ENAP bottleneck analysis tool and OHT, 4 survey questionnaires were designed, the first on readiness to conduct the pilot, the second for the local health administration on MCH service system and neonatal care delivery, the third for health facilities on capacity and intervention implementation, and the fourth and final questionnaire for costing data extraction.

Step 3: Data analysis

Quantitative data were analyzed by using MSEXcel. Qualitative data were analyzed using theme analysis. Data analysis results were presented in 3 parts: 1) neonatal health status and priority disease areas; 2) current neonatal service and bottlenecks, 3) costs and effect estimations for implementing the essential interventions, 4) stakeholders' attitudes to the pilot.

Step 4: Evidence sharing and feedbacks collecting

A one and half page evidence summary based on the analysis results was prepared for each county. Each province was given a 2-3 page note on all pilot counties in that province, to understand the common situations, potential costs and effects and recommendations for pilot implementation. The ultimate purpose was to inform local pilot plans.

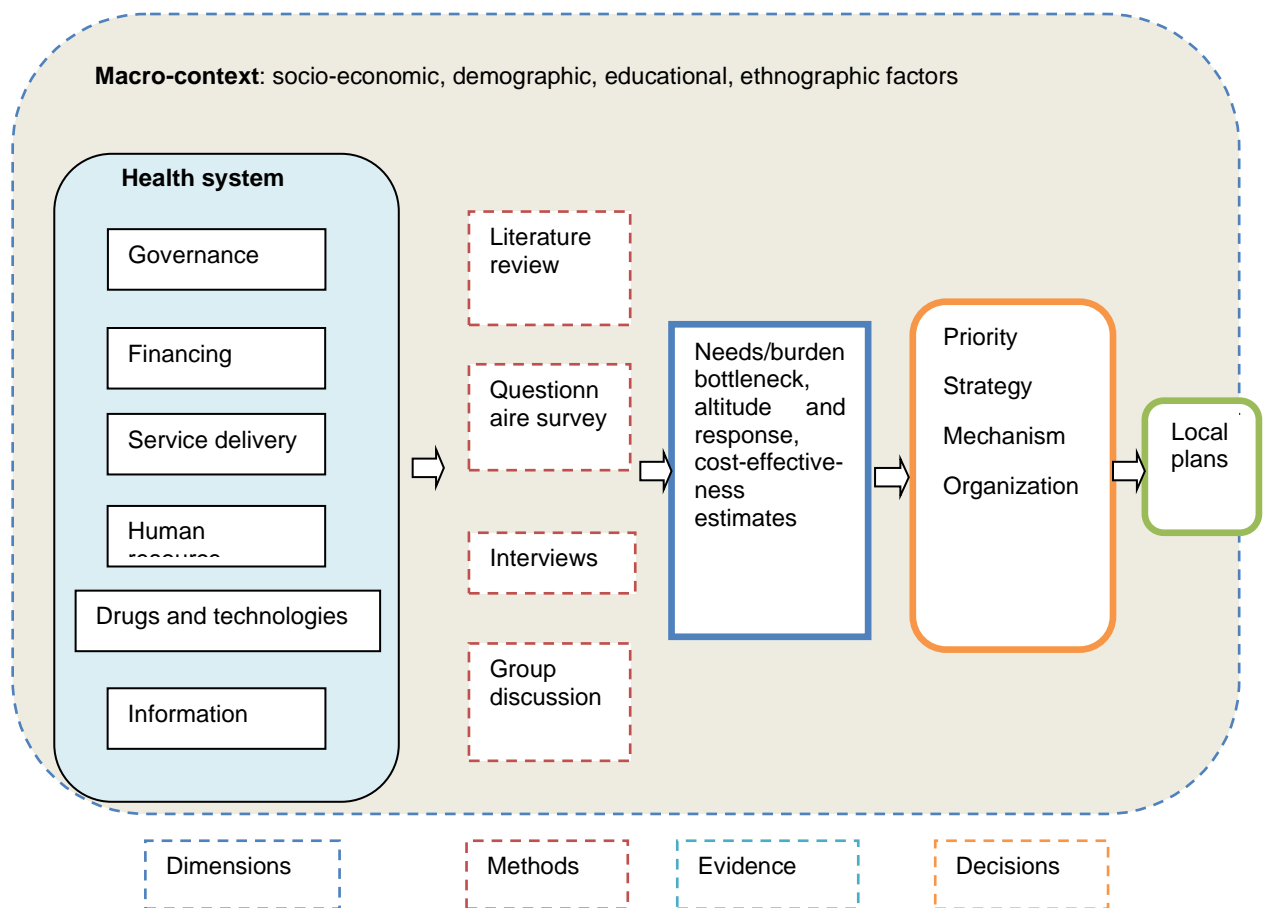


Figure 4 - 12 Framework of situational analysis

4.4.3 Methods

Mixed methods were employed in the studies.

1) Questionnaire surveys

Questionnaires on readiness for pilot were distributed to MCH policy-makers, hospital managers, and representative doctors (N=38), with 100% response rate. Questionnaires for county and provincial health administration were distributed and collected from pilot sites (N=24). Questionnaires for health facilities (N=187) were distributed, with 80% response rate. Field visits to 20 counties were conducted, interviews and focal group discussions done, with 136 health policy makers, 175 health managers and providers, and 179 mothers participating.

2) Costing and effect mapping

Costing and cost-effectiveness analysis were conducted using the One Health Tool to map the potential health gains and investment gaps. OHT is an online software that can project MCH intervention effect and costs with extensive demographic, epidemiologic, interventional, and costing data inputs. The unique feature of the tool is the facility for program and system level projection. Demproj module in OHT was used for calculating deaths and death rate, and LiST model for projecting effect of intervention scale up. Three types of parameters were collected, namely, 1) demographic data (population of each age group and gender, fertility rate), 2) population in need and the targets, and 3) direct and indirect costs of interventions.

3) Semi-structured interviews

Semi-structured interviews with key stakeholders (policy-makers, managers and care providers, patients and their families) in the pilot counties and provinces were conducted, to gather information on perceptions of and attitudes to ENAP. An interview guide was compiled, and a list of target interviewees (MCH policy-makers, hospital managers, providers and patients) was drawn up. Focal group discussions were designed to collect information of local government and relevant government agencies involved in health policy-making, such as local health insurance bureaus, bureaus of civil affairs, all-women's federations, etc.

4) Focus group discussion

Focus group discussions were arranged, which were participated by local politicians, MCH-related health policy-makers, and pilot coordination personnel to discuss about need and feasibility of pilot implementation.

4.4.4 Analysis results

(1) Socio-economic situations and other health determinants

The pilot areas are mostly nationally designated as poor counties inhabited by ethnic minorities. Most of the counties are located in remote mountainous or hilly areas (Table 4 - 20). The local illiteracy rate is high, especially among women. 6 counties of Sichuan are concentrated in Liangshan Prefecture, where local Yi people still adopt a very primitive living style and are experiencing the transition from feudalism to socialism. Most pilots have their unique local religions, cultures, social customs and rituals. Previous research already proved the linkage between socio-economic status and maternal and child health.

Table 4 - 20 Basic facts about the pilot sites

Pilot sites	Population (10,000)	Per capita GDP (10,000 Yuan)	Poverty incidence (%)	MMR (1/10,000)	NMR (‰)	IMR (‰)	U5MR (‰)
Sichuan Province 四川	9118.14	3.68	28.00	20.28	3.99	6.00	8.26
Yuexi County (岳西)	35.20	1.25	15.00	57.45	2.09	5.82	10.29
Xide County (喜德)	21.90	1.99	28.00	13.60	4.60	8.04	9.48
Zhaojue County (昭觉)	30.83	1.07	17.32	120.63	1.50	5.17	7.21
Muli County (木里)	13.99	2.02	14.93	0.00	7.84	9.05	9.65
Jinyang County (金阳)	20.46			44.75	3.84	10.33	20.36
Meigu County (美姑)	26.48	21.16	27.5				
Butuo County (布托)							
Ningxia Province 宁夏省	674.90	4.69		19.98	5.05	7.18	9.24
Longde County (隆德)	15.70	1.44	10.00	35.30	5.57	9.76	12.54
Haiyuan County (海源)	40.25	1.22	16.60	26.31	6.58	11.18	14.08
Hongsipu County (红寺堡)	19.74	0.86	13.10	0.00	5.10	8.22	11.05
Guizhou Province 贵州	3555.00	3.31		27.25	4.52	7.88	10.91
Qinglong County (晴隆)	33.40	1.96	24.00	34.34	4.75	8.48	12.89
Sinan County (思南)	68.60	1.70	16.35	0.00	6.01	10.99	15.80
Songtao County (松桃)	76.12	2.33	14.42	33.93	2.11	6.06	7.64
Liping County (利平)	55.68	2.05	21.25	13.18	6.28	8.68	9.78
Qinghai Province 青海省	593.46	4.35		31.53	6.70	9.70	11.98

Tongren County (铜仁)	9.26			145.84	4.50	10.49	13.49
Gangcha County (刚察)	4.61	3.69	8.42	0.00	5.85	0.00	126.71
Datong County (大通)	46.13	2.19	6.91	74.96	8.84	9.83	10.81
Minhe County (民和)	43.63	2.09	11.40	19.65	6.87	9.33	11.54
Guide County (贵德)	10.40	2.34	10.30	24.55	8.47	15.54	16.24

Notes: 1. MMR: maternal mortality rate; NMR: newborn mortality rate; IMR: infant mortality rate; U5MR: under five children mortality rate.

(2) Main factors influencing neonatal care

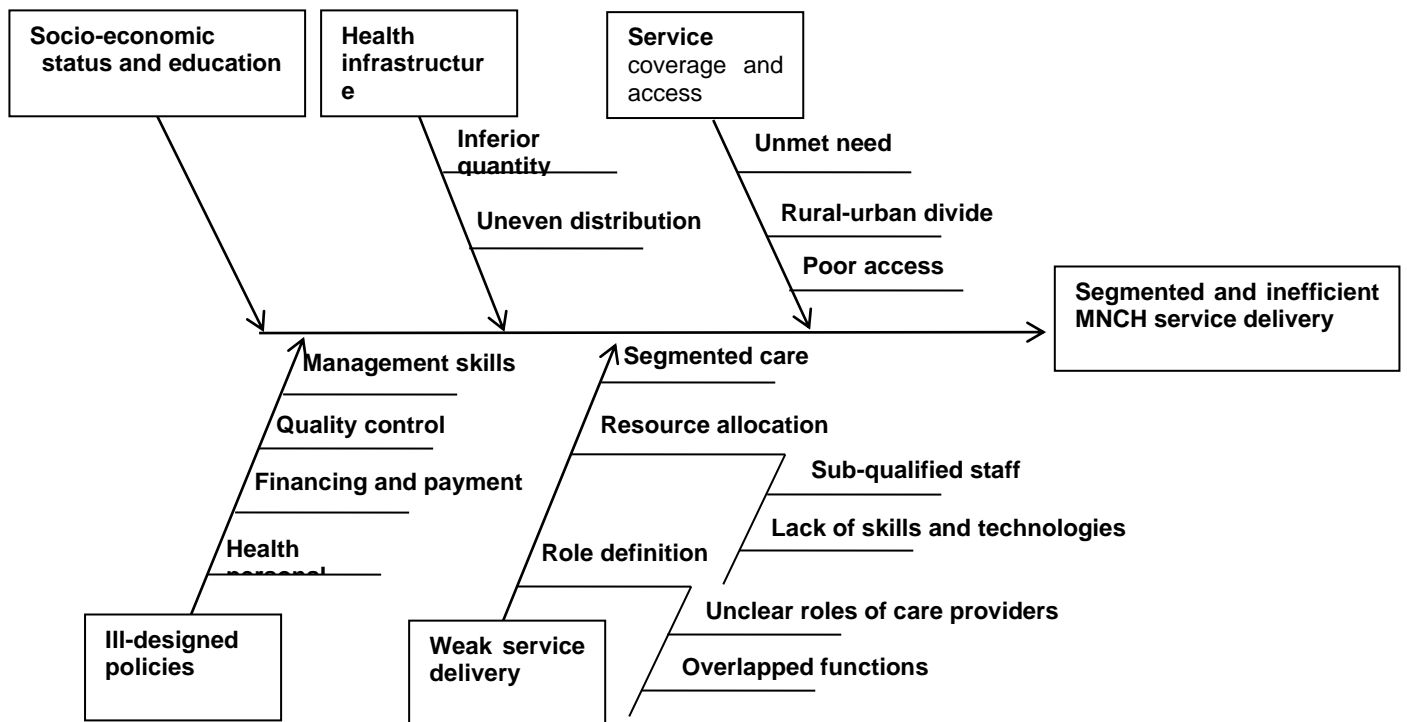


Figure 4 - 13 Factors influencing MCH care delivery in the pilot sites

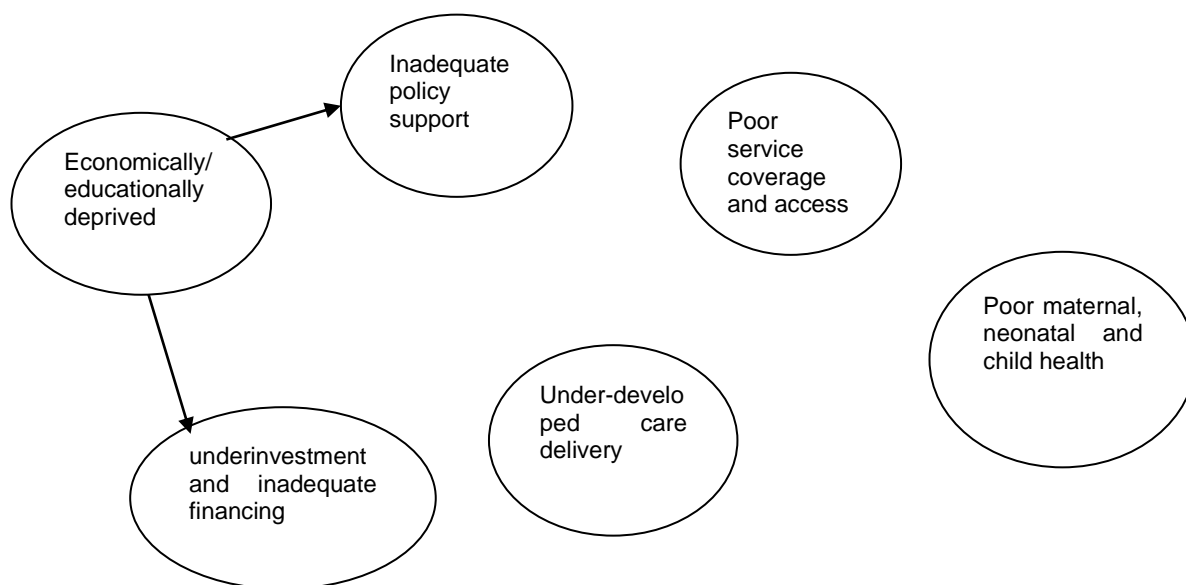


Figure 4 - 14 Relationships of the influencing factors

Previous studies on maternal, neonatal and child health in these pilot areas and other poor rural western counties showed that many problems may influence the service delivery and utilization. Besides socio-economic and demographic factors, there are health determinants identified within the health system, such as poor infrastructure, ill-designed policies, weak delivery capacity, and inadequate service utilization (

). These influencing factors are entangled and forming interdependent and complex relationships (Figure 4 - 14).

(2) Neonatal health and priority areas

Based on the analysis of the officially reported mortality data in 2016, maternal and child health status varied greatly in the pilot counties (Figure 4 - 15, Figure 4 - 16). The maternal mortality rate in 70% of the pilots were higher than the national average, while the neonatal mortality rate in 55% pilots was higher than the national average. Some counties in Sichuan Province reported issues of under-reporting and missing data. Pilots with better information system and well-regulated reporting systems paradoxically had higher

neonatal mortality rates.

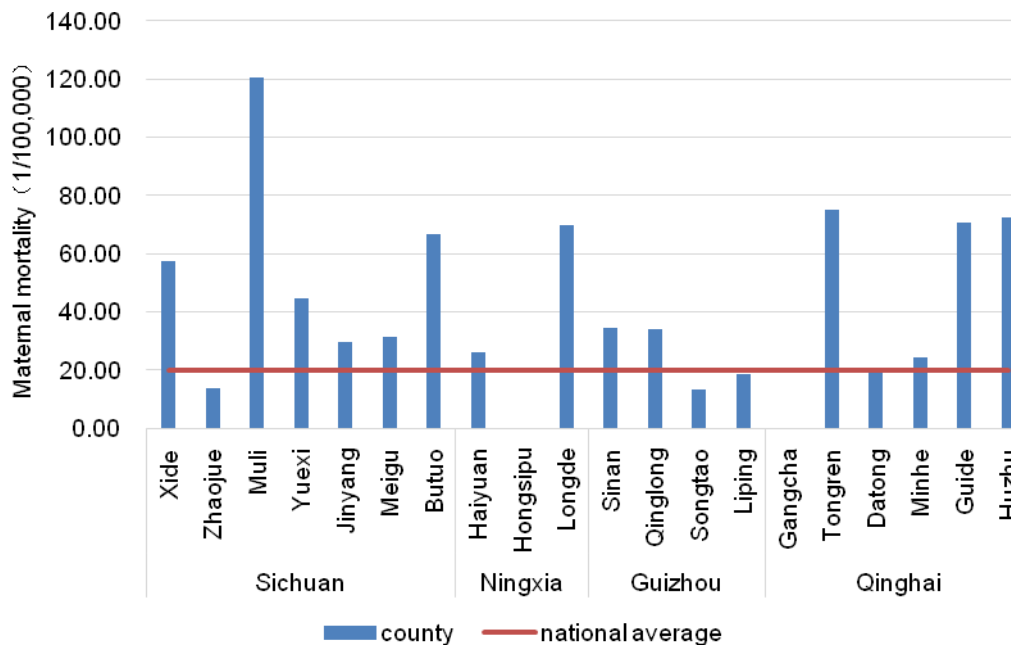


Figure 4 - 15 Maternal mortality rate of pilot counties in 2016 (1/100,000)

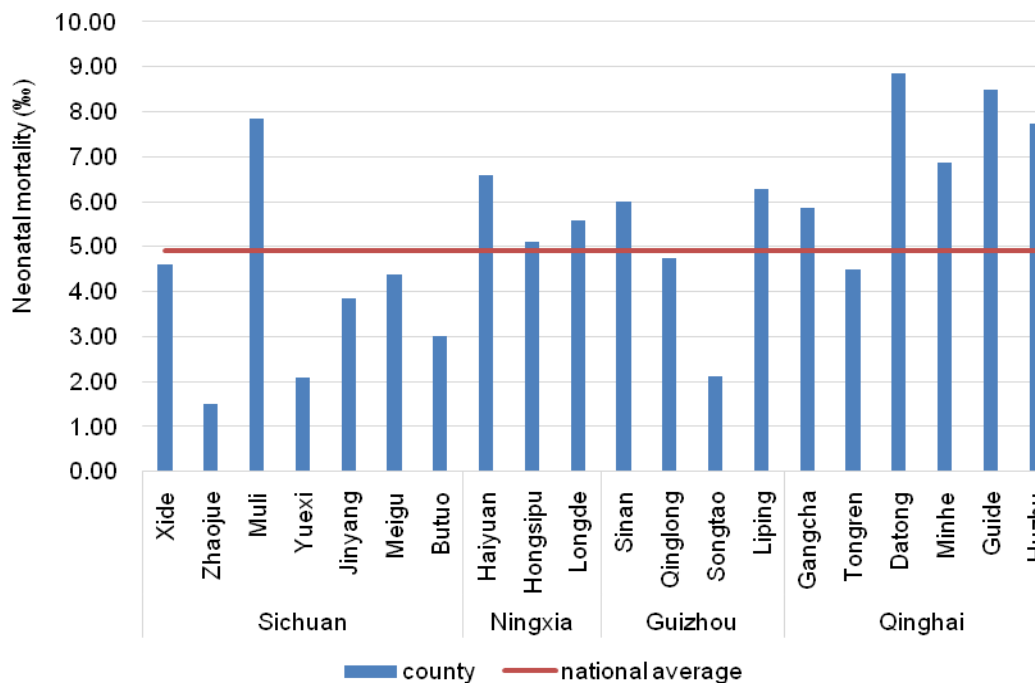


Figure 4 - 16 Neonatal mortality rates of pilot counties in 2016 (%)

Based on analysis of neonatal death review done in the pilot areas in 2016, the top 3 causes were asphyxia (44%), premature and low-birth-weight (36%), and birth defects (10%) (Figure 4 - 17). Inadequate prenatal care and hospital delivery were prioritized as root causes.

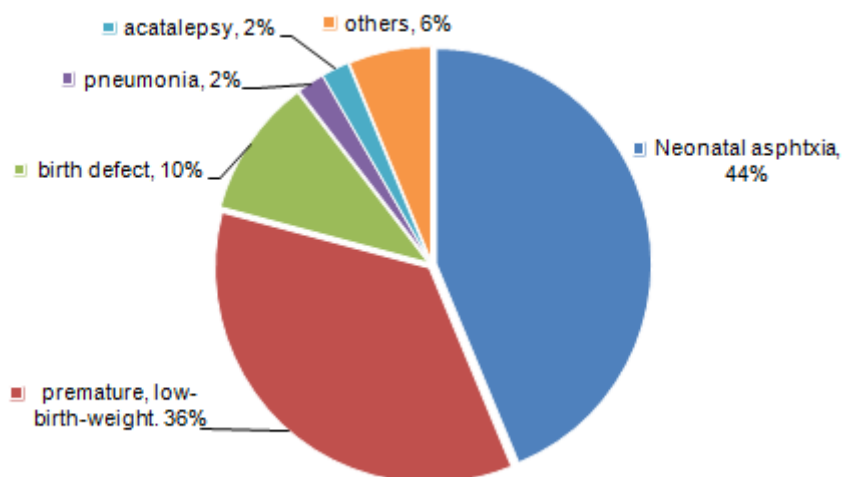


Figure 4 - 17 Main causes of neonatal deaths in 2016

(3) Local MCH service delivery systems and main bottlenecks

① Governance and structure of MCH service

MCH policy-making and service delivery in China has adopted the structure as shown in Figure 4 - 18. The Chinese health system contains separate sub-systems on maternal and child health. At the central level, the Department of Maternal and Child Health, National Health Commission takes charge of national policy development and goal setting. At sub-national level, health bureaus in cities and provinces are in charge of MCH service planning and program implementation. Medical and public health services are delivered by different facilities. MCH centers are designed facilities for implementing MCH programs and MCH data collecting and reporting. There are other actors engaged on program implementation, such as the Women's Federations, civil affairs bureau, and the general administration of local governments. Since 2017, anti-poverty campaigns have been launched by President Xi Jinping's government. Many programs targeting on poor women and children have been implemented, under the leadership of the local governments.

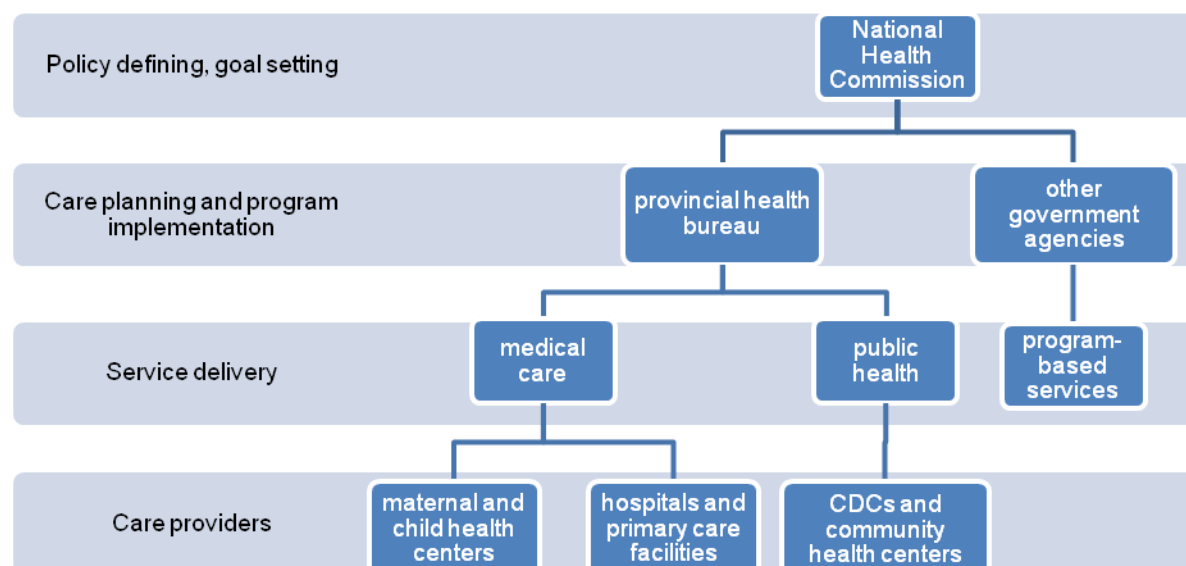


Figure 4 - 18 Maternal and child care decision-making and service delivery

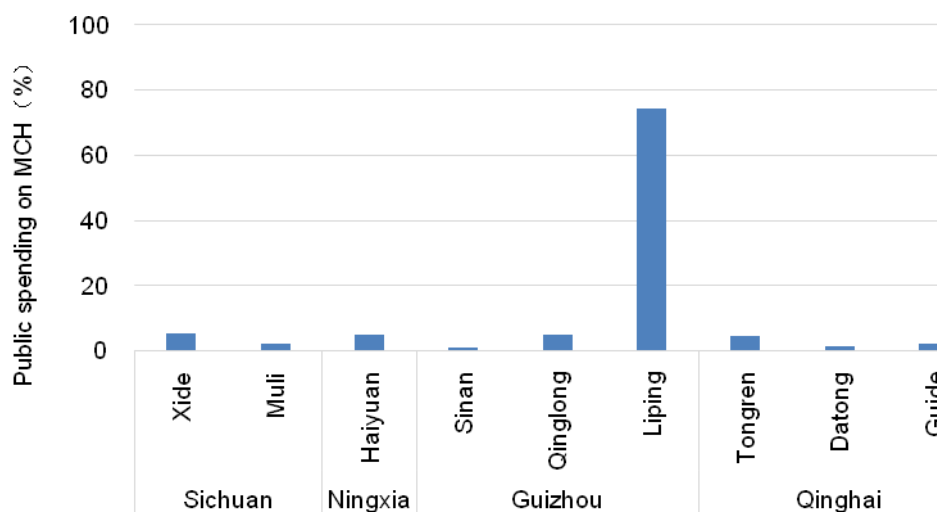
In the 13th Five Year Plan Period (2016-2020), a major national health plan -- “Healthy China 2030” -- was issued and prioritized maternal and child health. A series of national MCH policies were released, providing the basic policy framework for the provinces to develop their own detailed action plans. Table 4 - 21 shows the main policies related to neonatal care in the 4 pilot provinces, majorly concerning financing, care planning, capacity building, etc.

Table 4 - 21 Main MCH policies adopted in the pilot provinces

Province	Policies	Year of issuance
Sichuan	Notice on Strengthening Maternal and Child Health	2016
	Reform and development of child health in Sichuan Province	2016
	Technical Support for Maternal and Child Health Development in County Hospitals	2016
	Notice on Providing Poor Mothers with Public Subsidies for Hospital Delivery	2016
	Workplan for Providing Free Pre-conception Checkups	2017
	Guide on Construction of Medical Centers for Treating Critically-ill Pregnant Women	2017
Guizhou	Notice on Facilitating Health Reforms and Development	2016
	Workplan on Treating Critically-ill Pregnant Women and Newborns	2016
	Notice on Strengthening Reform and Development of Child Health Service	2016
Ningxia	Plan for Improving Community Health Service (2016-2018)	2016
	Notice on Providing Fee Exemptions and Financial Assistance for Maternal and Child Health Services	2014
Qinghai	Workplan on Treating Critically-ill Pregnant Women and Newborns	2017
	Action Plan on Healthy Qinghai 2030	2016
	Notice on Strengthening Whole-cycle Care for Child Bearing	2016
	Implementation Plan for Strengthening Reform and Development of Child Health Service in Qinghai Province (2016-2020)	2015
	Plan for Training of Pediatricians and Other Professionals Related to Child Health Service in Qinghai Province (2016-2020)	2015

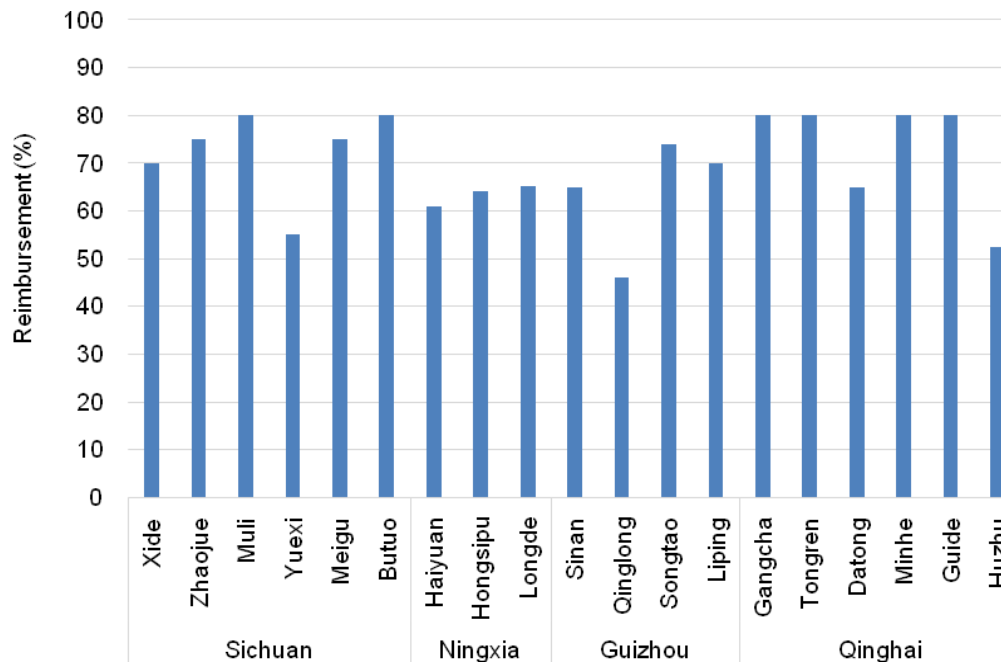
② Financing of care

Based on the literature review and investigation result, the financing policy, investment and out-of-pocket payment situation of neonatal health care have been analyzed. The total investment in maternal and child health filed is less than 10% of the government health investment in 84% pilot areas (Figure 4 - 19). According to the reimbursement ratio of the New Rural Cooperative Medical System (NCMS), Urban Employee Basic Medical Insurance (UEBMI) and Urban Resident Basic Medical Insurance (URBMI), URBMI has the lowest reimbursement ratio (Figure 4 - 20, Figure 4 - 21, Figure 4 - 22).



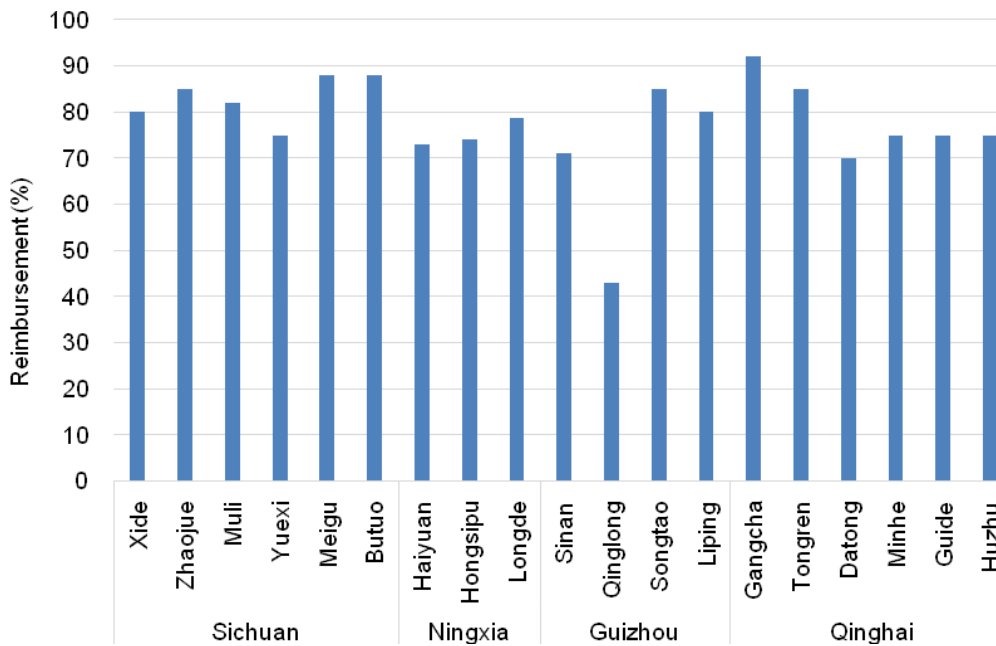
Note: Missing data for the other pilot counties

Figure 4 - 19 MCH expenditure as a share of the total government spending in 2016 (%)



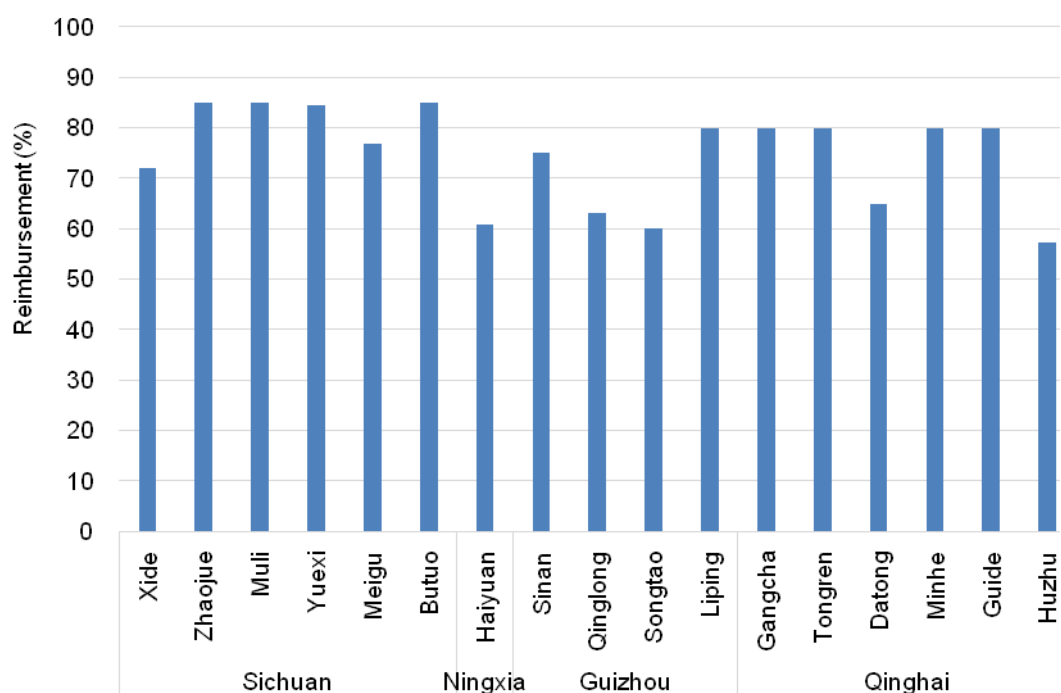
Note: Missing data for Jinyang County

Figure 4 - 20 Reimbursement level of the Social Medical Insurance for urban residents (%)



Note: Missing data for Jinyang County

Figure 4 - 21 Reimbursement level of the Basic Medical Insurance for urban employees (%)

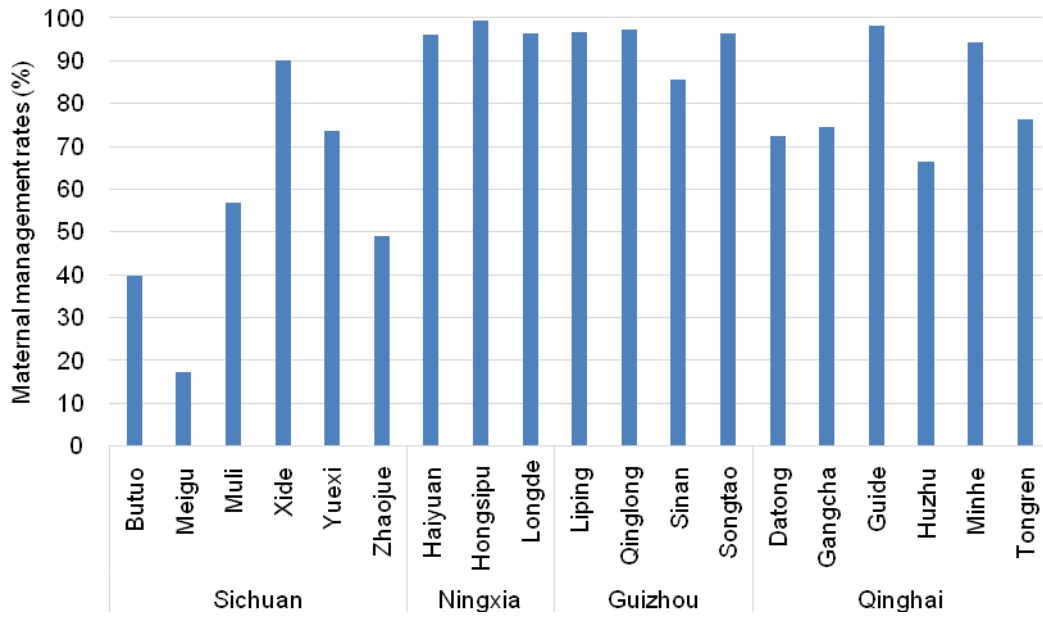


Note: Missing data for Jinyang County, Hongsipu County or Longde County.

Figure 4 - 22 Reimbursement level of the new Rural Cooperative Medical Scheme for rural residents (%)

③ MCH service delivery

The maternal management rates varied among the pilot counties (Figure 4 - 23). In general, the pilots with a high proportion of minority population had low rates of maternal management. Hospital delivery rates were also significantly different, from 68.52% of Muli (Sichuan Province) to 100% of Guide (Qinghai Province) (Figure 4 - 24). Exclusive breast-feeding of babies under 6 months rate in Yuexi (Sichuan Province) is 37.75%, which is 2.63 times lower than Hongsibu (Ningxia Province) (99.49%) (Figure 4 - 25).



Note: Missing data for Jinyang County

Figure 4 - 23 Maternal management rates in pilot counties in 2016 (%)

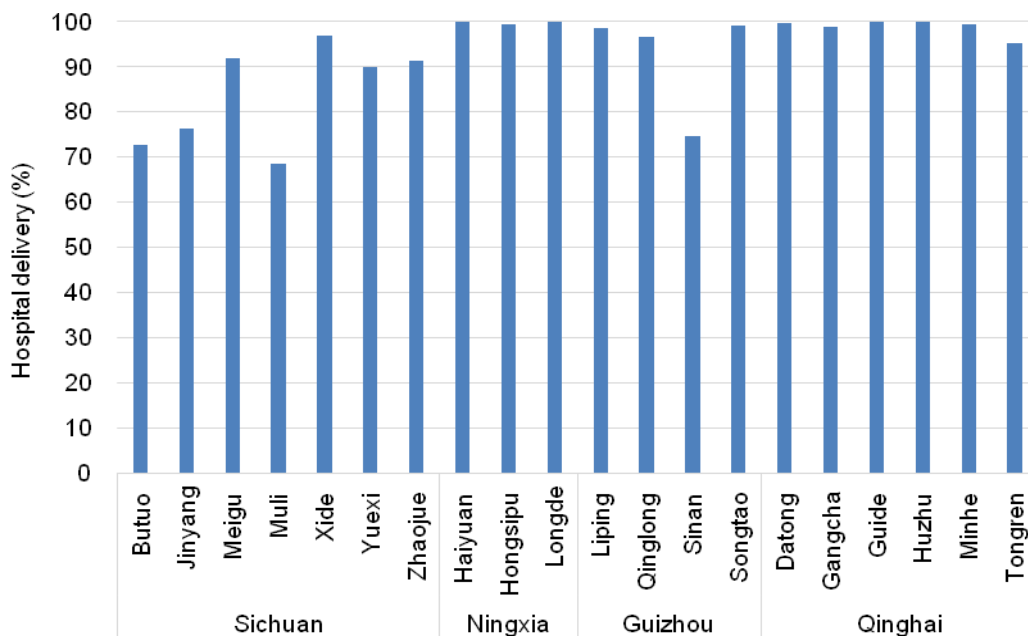
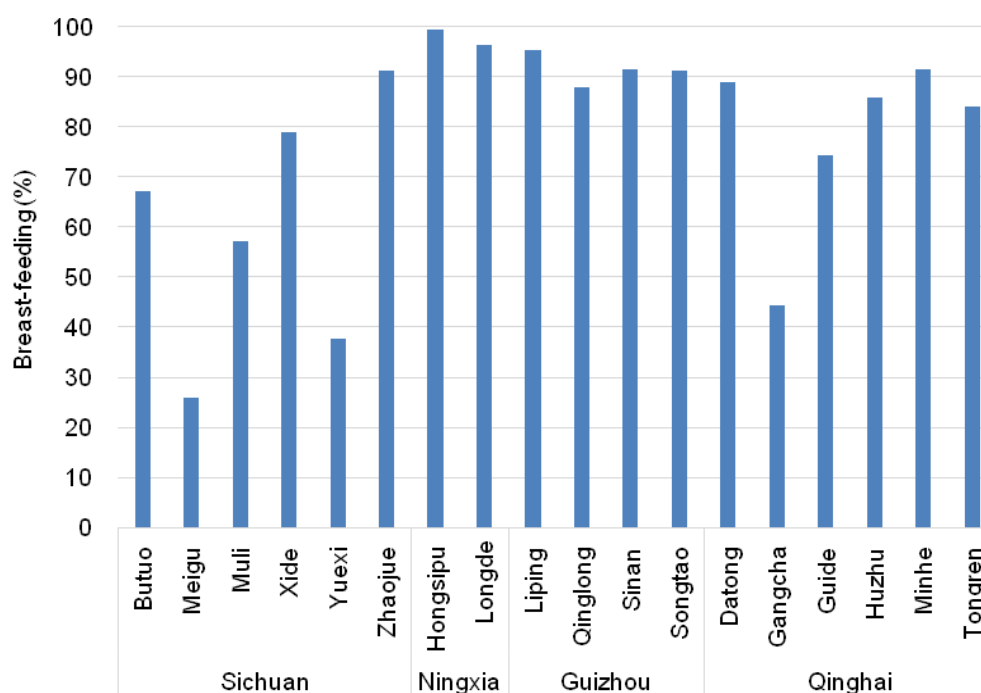


Figure 4 - 24 Hospital delivery rates in pilot counties in 2016 (%)



Note: Missing data for Jinyang and Haiyuan County

Figure 4 - 25 Exclusive breast-feeding of babies under 6 months in pilot counties in 2016 (%)

Most of the core neonatal interventions have been implemented in pilots. However, there is a small or little coverage of new interventions, such as kangaroo mother care (22.02%), delayed umbilical cord ligation and immediate neonatal skin contact (Table 4 - 22, Figure 4 - 26).

Table 4 - 22 Implementation of 7 core neonatal interventions in pilot counties

Province	County	Neonatal resuscitation	Delay umbilical cord ligation	Neonatal immediately Skin contact	Newborn eye care	Neonatal intramuscular injection of vitamin K1	Breastfeeding for infants between 6 months	Kangaroo mother care
Sichuan	Butuo							
	Jinyang							
	Meigu							
	Muli							
	Yuexi							
	Zhaojue							
	Xide							
Ningxia	Longde							
	Haiyuan							

	Hongsipu							
Guizhou	Qinglong							
	Sinan							
	Songtao							
	Liping							
	Datong							
Qinghai	Gangcha							
	Guide							
	Huzhu							
	Minhe							
	Tongren							

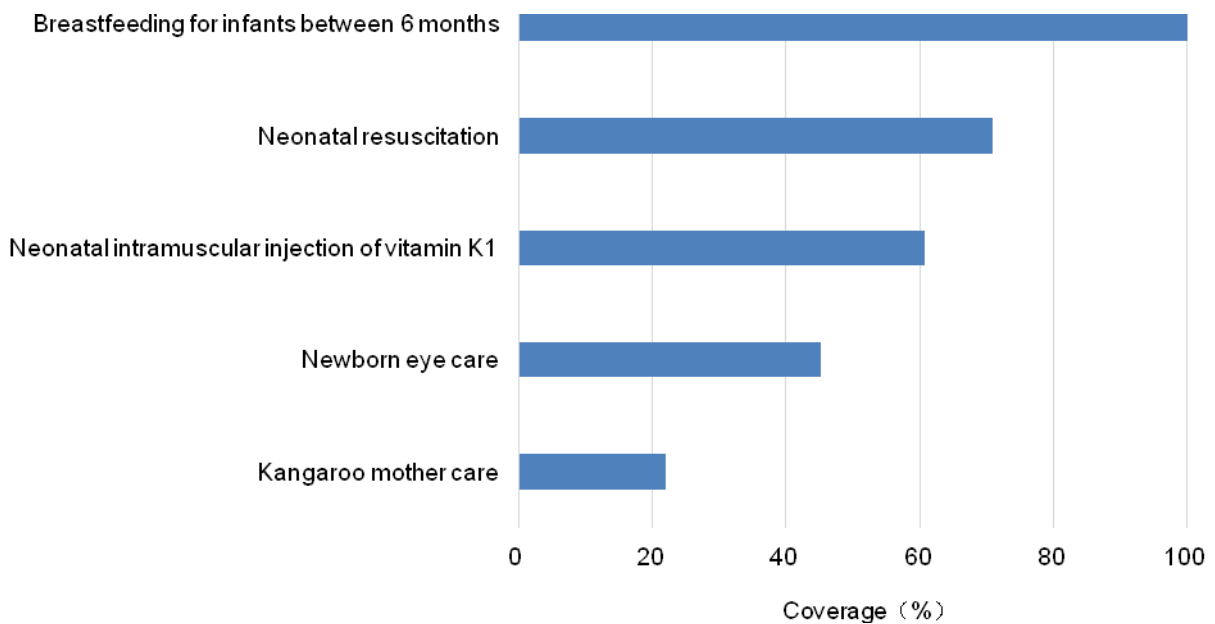


Figure 4 - 26 Coverage of 7 core neonatal interventions in pilot hospitals in 2016

Most of the optional neonatal interventions could be provided by pilot facilities, though with uneven coverage. For instance, 91.67% pilot hospitals could provide oral administration of folic acid and other nutrient supplements during pregnancy, 87.30% provide syphilis treatment & management. Prevention of postpartum hemorrhage is provided in 69.05% hospitals, and pregnancy hypertension management in 75% hospitals. But coverage of antibiotics on

preterm with premature rupture of membrane, indicated cesarean section and neonatal septicemia was less than 50% (Table 4 - 23, Figure 4 - 27).

Table 4 - 23 Implementation of 7 optional neonatal interventions in pilot counties in 2016

Province	County	Syphilis treatment and management	Cesarean section with indications	Oral administration of folic acid in perinatal period	Prevention and treatment of pregnancy-induced hypertension	Application of antibiotics on preterm with premature rupture of membrane	Prevention and management of postpartum hemorrhage	Neonatal septicemia (antibiotic injection)
Sichuan	Butuo							
	Jinyang							
	Meigu							
	Muli							
	Xide							
	Yuexi							
	Zhaojue							
Ningxia	Longde							
	Haiyuan							
	Hongsipu							
Guizhou	Qinglong							
	Sinan							
	Songtao							
	Liping							
Qinghai	Datong							
	Gangcha							
	Guide							
	Huzhu							
	Minhe							
	Tongren							

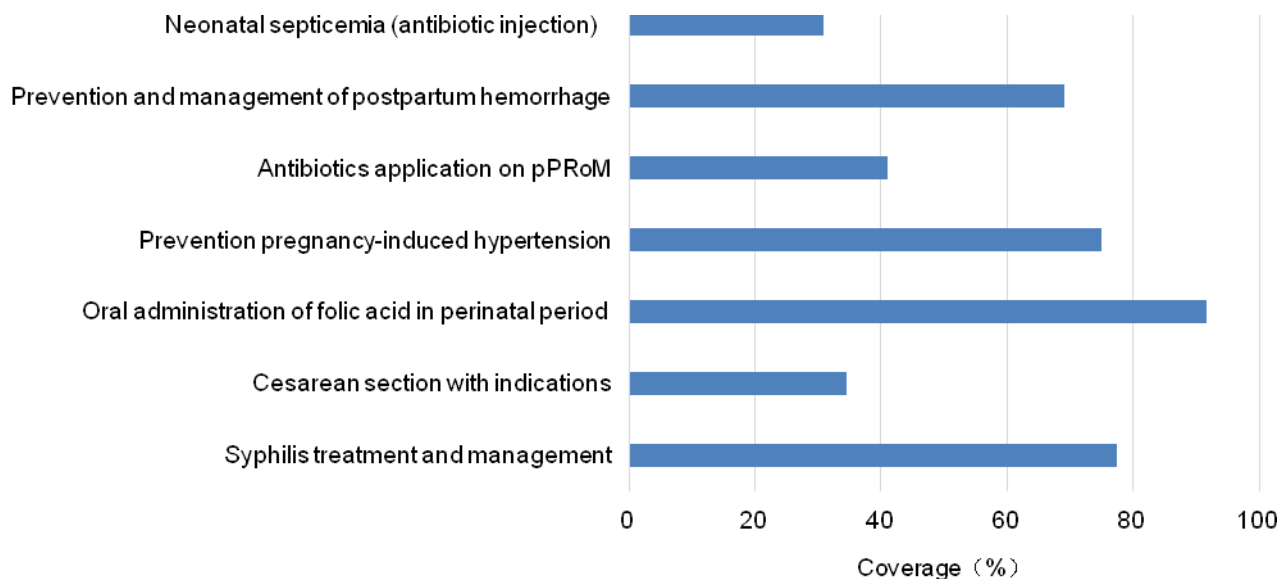


Figure 4 - 27 Coverage of 7 optional neonatal interventions in pilot hospitals in 2016

④ Obstetric and pediatric beds

Obstetric and pediatric beds were the main resources for MCH service provision. In the 12th Five Year Plan Period, most of the maternal infrastructure has been strengthened in western provinces. Therefore, density of obstetric beds was adequate in most pilot counties (Figure 4 - 28). Pediatric beds were in shorter supply (Figure 4 - 30). However, both Obstetrician and Pediatrician per bed were less than national average level (Figure 4 - 29, Figure 4 - 31).

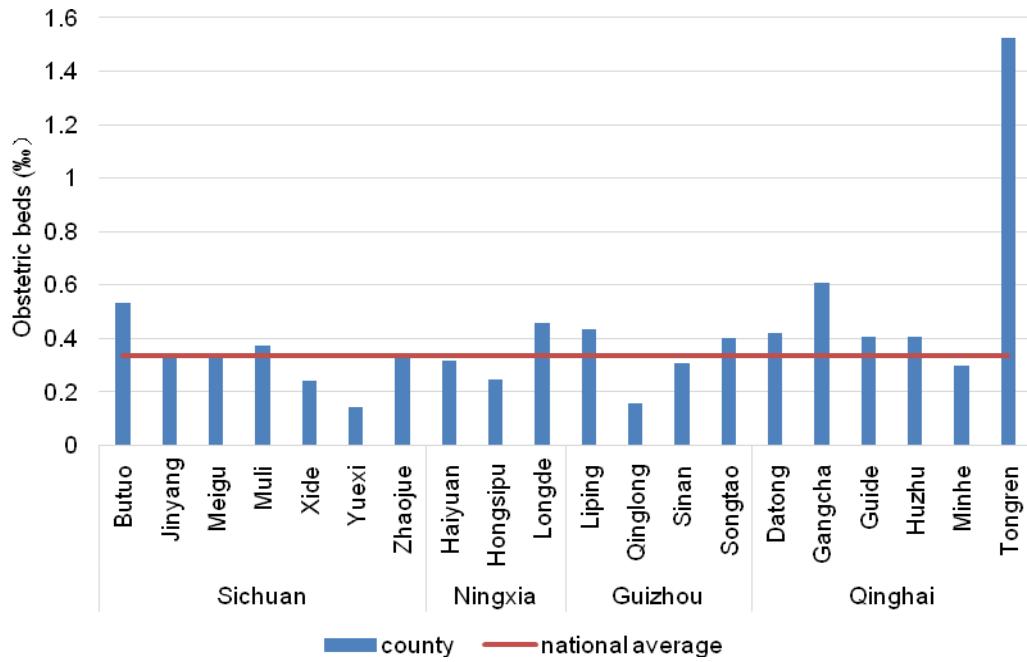


Figure 4 - 28 Obstetric beds per 1,000 population

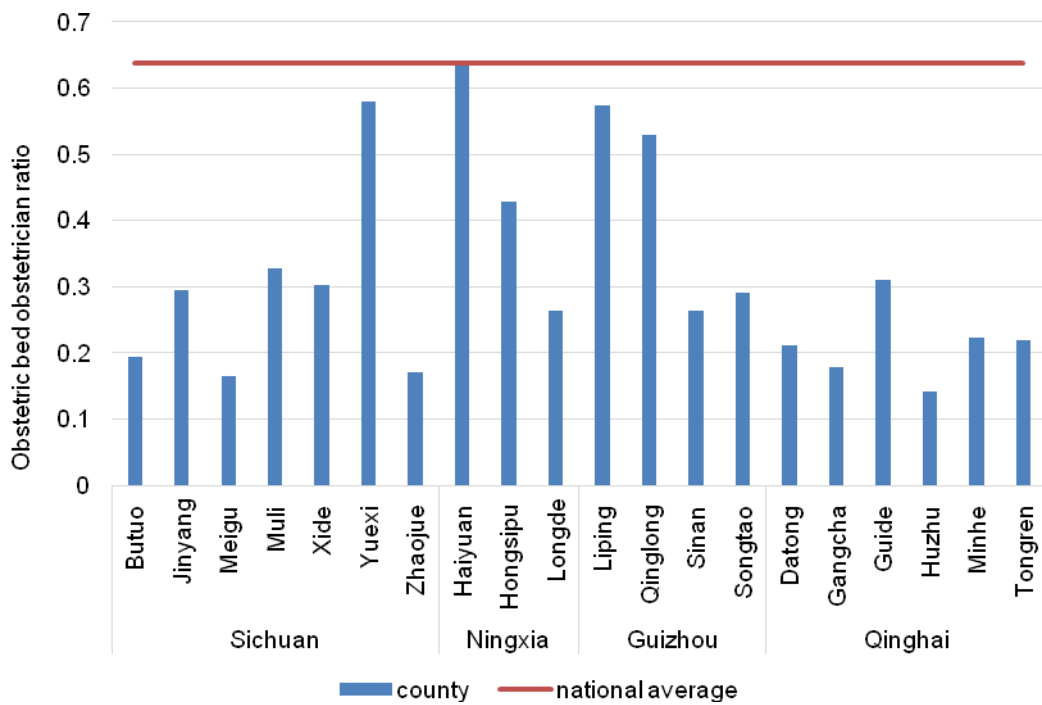


Figure 4 - 29 Obstetrician per bed

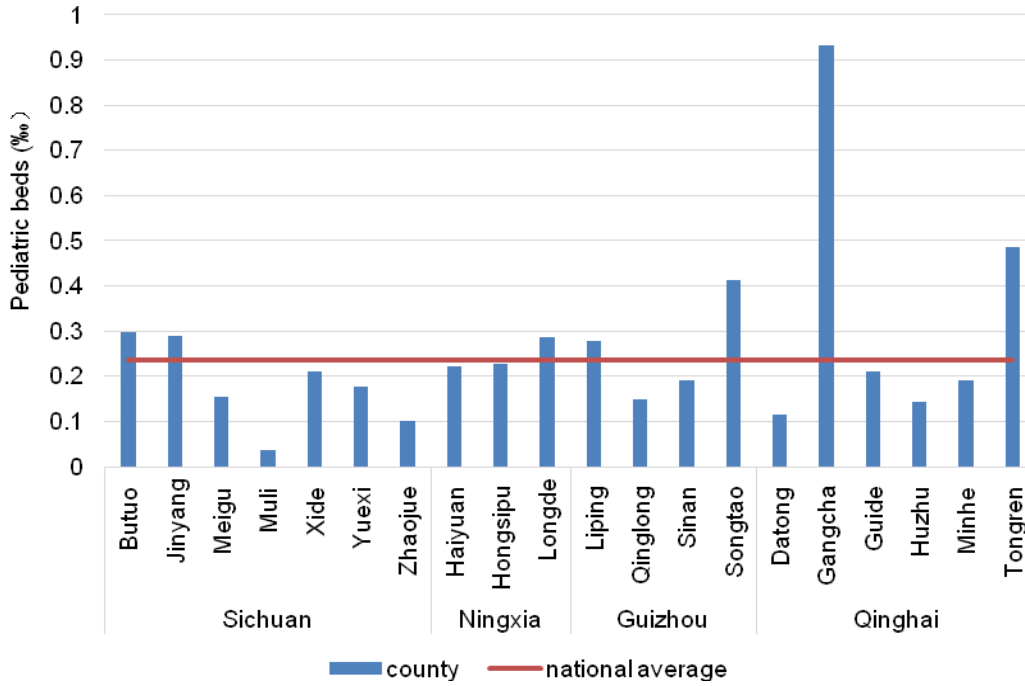


Figure 4 - 30 Pediatric beds per 1,000 population

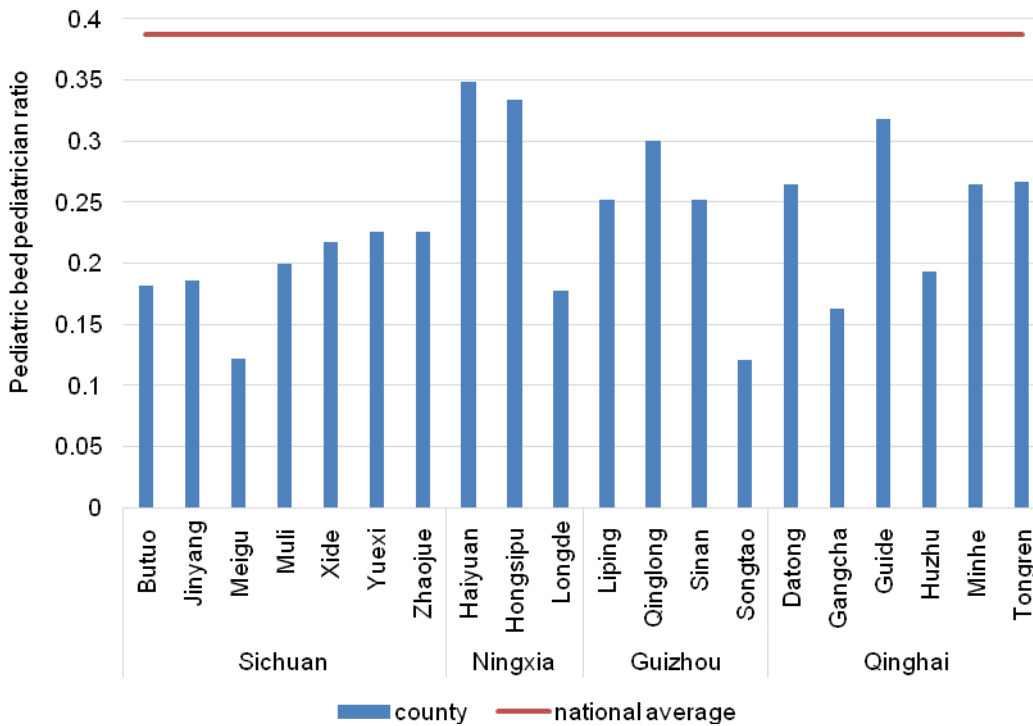


Figure 4 - 31 Pediatrician per bed

⑤ Human resources

All pilot counties experienced shortage in key human resources for MCH care

provision, such as obstetricians (Figure 4 - 32), midwives (Figure 4 - 33), and pediatricians (Figure 4-34). The average obstetricians per 1000 population is 0.10 in pilot counties, fewer than the national average (0.21‰). The average midwives per 1,000 population is 0.06. Haiyuan of Ningxia Province has the lowest density of midwives (less than 0.02‰). 85% pilot counties are below the national average (1.56‰).

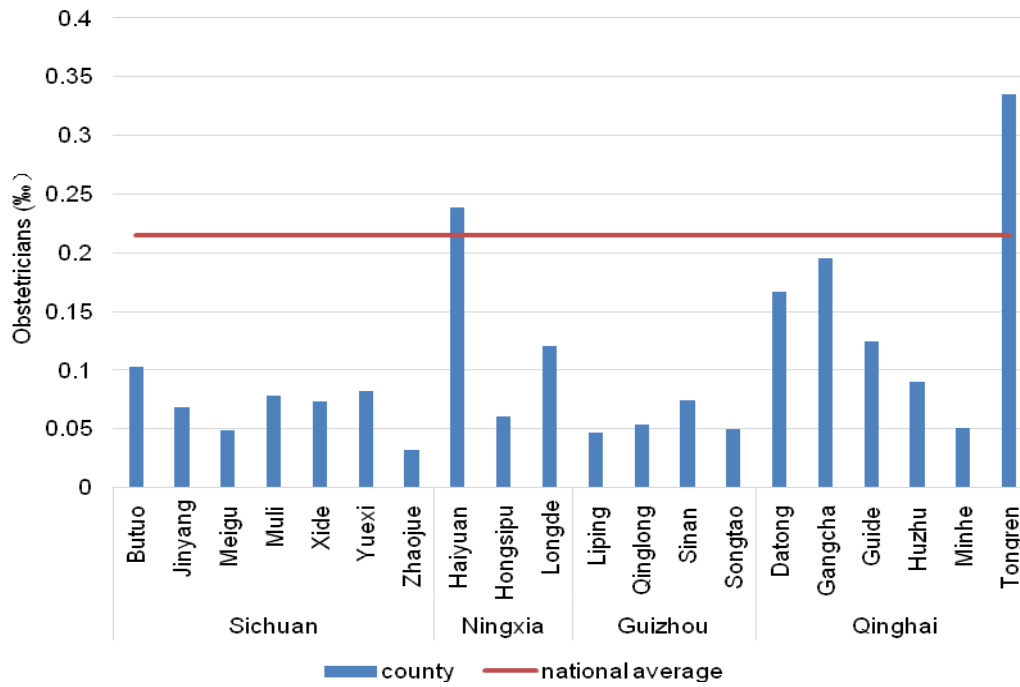
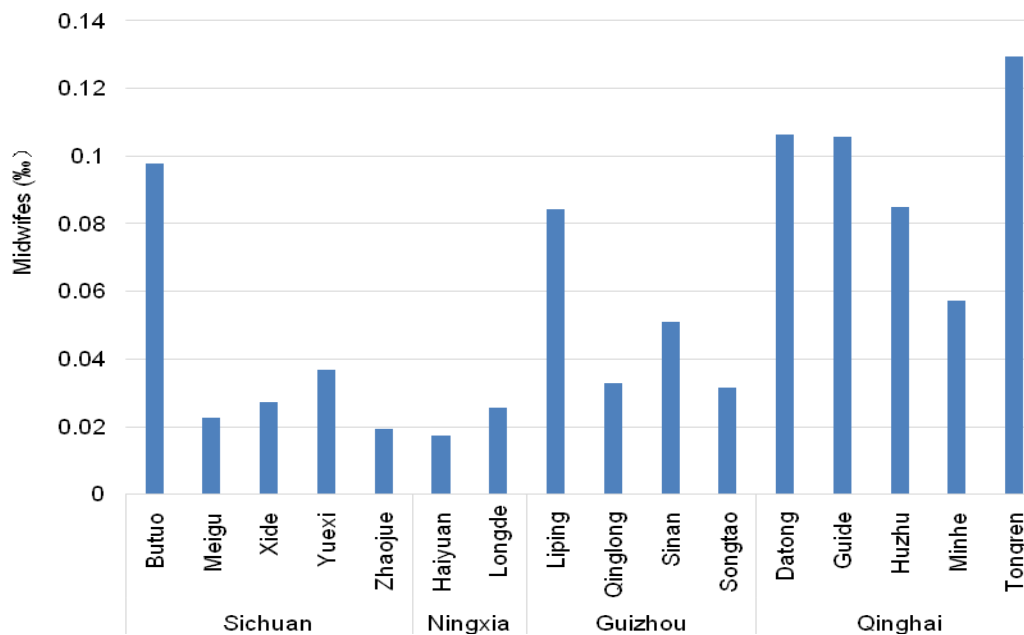


Figure 4 - 32 Obstetricians per 1,000 population



Note: Missing data for Hongsipu County, Gangcha County, Muli County or Jinyang County.

Figure 4 - 33 Midwives per 1,000 population

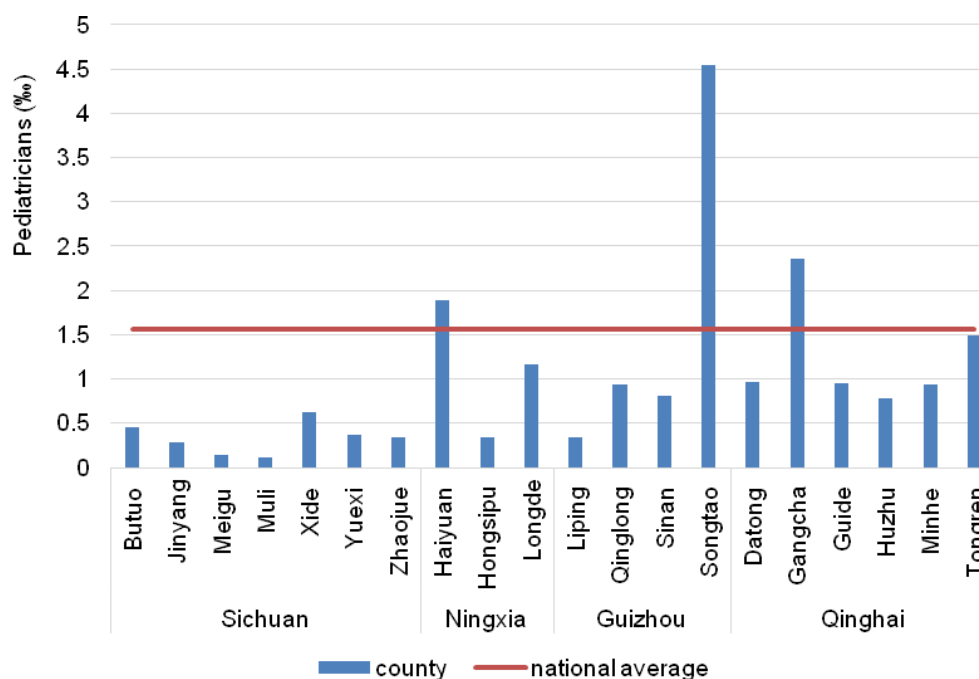
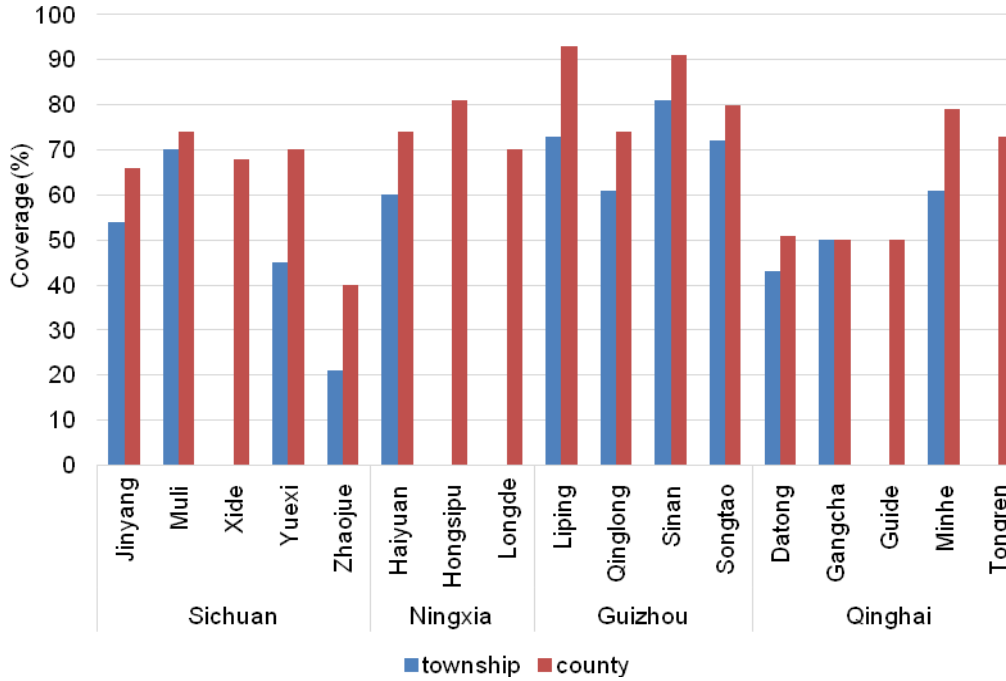


Figure 4 - 34 Pediatricians per 1,000 children under five

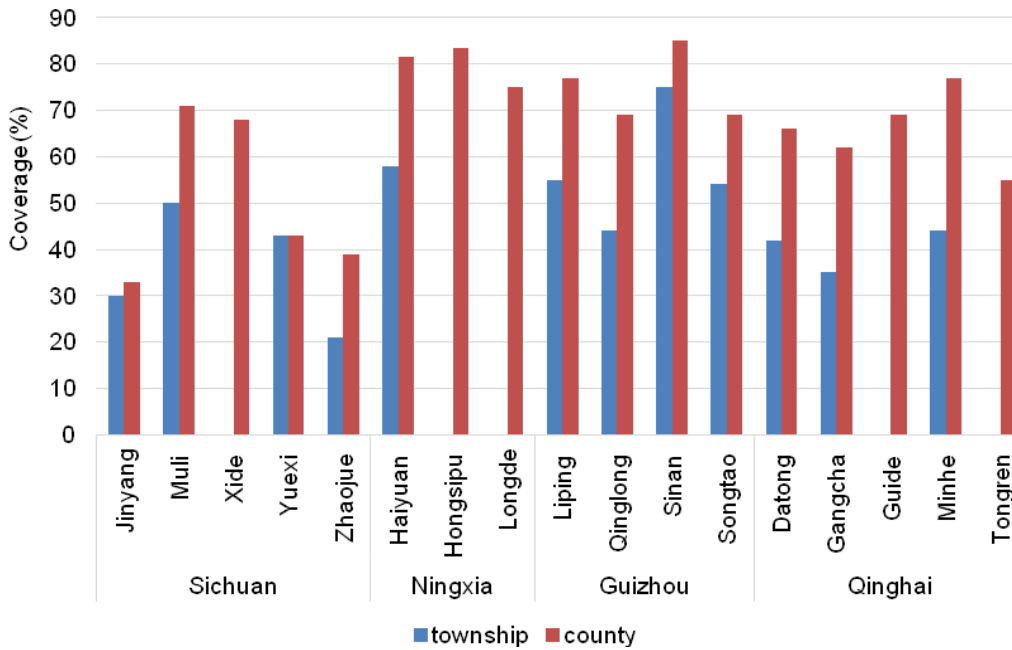
⑥ Drugs and technologies

Availability of 47 essential MCH drugs and 18 basic MCH technologies varied greatly among the pilot institutions (Figure 4 - 35; Figure 4 - 36). Availability of drugs was highest in Sinan County of Guizhou (84%), and the lowest in Zhaojue County of Sichuan (24%). Generally, county hospitals were better equipped than township health centers. On average, 64% of 18 basic technologies were available in the pilot counties. Only 27.79% of the 18 technologies were available in Zhaojue County, Sichuan, indicating a serious lacking of basic MCH drugs and technologies.



Note: Missing data in Butuo County, Meigu County or Huzhu County.

Figure 4 - 35 Coverage of 47 essential drugs in pilot counties in 2016 (%)



Note: Missing data for Butuo County, Meigu County or Huzhu County.

Figure 4 - 36 Coverage of 18 basic MCH technologies (%)

⑦ Information

Information infrastructure was generally poor in the pilot areas. Hence, the

health information system was also relatively weak in these pilot hospitals. Data reporting and sharing was identified as a main barrier to better coordination of MCH care in these areas. Pilots with better information system and data reporting mechanisms paradoxically had higher for neonatal mortality rates.

(4) OHT-based analysis of costs, effects and main resource gaps

Based on the national implementation plan, all pilots are supposed to deliver the 7 core interventions, while the 7 optional interventions are up to the local people to choose if they want to implement (Table 4 - 24).

Table 4 - 24 Core and optional interventions

No.	Interventions
1	Neonatal resuscitation (institutional)
2	Delayed umbilical cord clamping
3	All breathing newborns receive immediate skin-to-skin contact for at least 90 minutes
4	Newborn eye prophylaxis(erythromycin ointment or 2.5% povidone iodine eye drops)
5	Newborn muscle injection of Vitamin K
6	Breastfeeding counseling and support
7	Kangaroo mother care
8	*Syphilis detection and treatment (pregnant woman)
9	*Labor and delivery management
10	*Daily iron and folic acid supplementation(pregnant woman)
11	*Hypertension disorder case management
12	*Antibiotics for pPRoM
13	*Active management of the 3rd stage of labor
14	*Neonatal sepsis - diagnosis and treatment

Items with "*" are core interventions

Questionnaire surveys were conducted to collect the local decision-makers and project implementers' options of preferential interventions. Most of the pilot counties chose to provider all 14 interventions (Table 4 - 25).

Table 4 - 25 Implementation of interventions

		Mandatory interventions							Optional interventions						
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Sichuan	Butuo	√	√	√	√	√	√	√	√	√	√	√	√	√	×
	Jinyang	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Meigu	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Muli	√	√	√	√	√	√	√	√	√	√	√	√	√	×
	Yuexi	√	√	√	√	√	√	√	√	√	√	√	×	√	×
	Xide	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Zhaojue	√	√	√	√	√	√	√	√	√	√	√	√	√	×
Ningxia	Haiyuan	√	√	√	√	√	√	√	√	√	√	√	√	√	
	Hongsibao	√	√	√	√	√	√	√	√	√	√	√	√	√	
	Longde	√	√	√	√	√	√	√	√	√	√	√	√	√	
Guizhou	Qinglong	√	√	√	√	√	√	√	√	√	√	√	√	√	
	Liping	√	√	√	√	√	√	√	×	√	√		√	√	
	Sinan	√	√	√	√	√	√	√	√	√	√	√	√	×	
	Songtao	√	√	√	√	√	√	√	√	√	√	×	×	×	
	Datong	√	√	√	√	√	√	√	√	√	√	√	√	√	
Qinghai	Gangcha	√	√	√	√	√	√	√	√	√	√	√	√	√	
	Guide	√	√	√	√	√	√	√	√	√	√	√	√	√	
	Huzhu	√	√	√	√	√	√	√	√	√	√	√	√	√	
	Minhe	√	√	√	√	√	√	√	√	√	√	√	√	√	
	Tongren	√	√	√	√	√	√	√	√	√	√	√	√	√	

① Cost analysis

The total cost of implementing the 7 core interventions in the 20 counties is \$ 3,034,598 ¹⁷(Figure 4 - 37). The lowest cost is \$ 11,434 for Tongren county of Qinghai province, while the highest cost is \$ 637,488 in Songtao county of Guizhou province. Factors contributing to the cost gaps include size of target population, coverage, medical prices, and salaried of medical staff.

¹⁷ All cost data are converted from RMB Yuan to US dollars based on the exchange rate on December 30, 2016 (0.144:1).

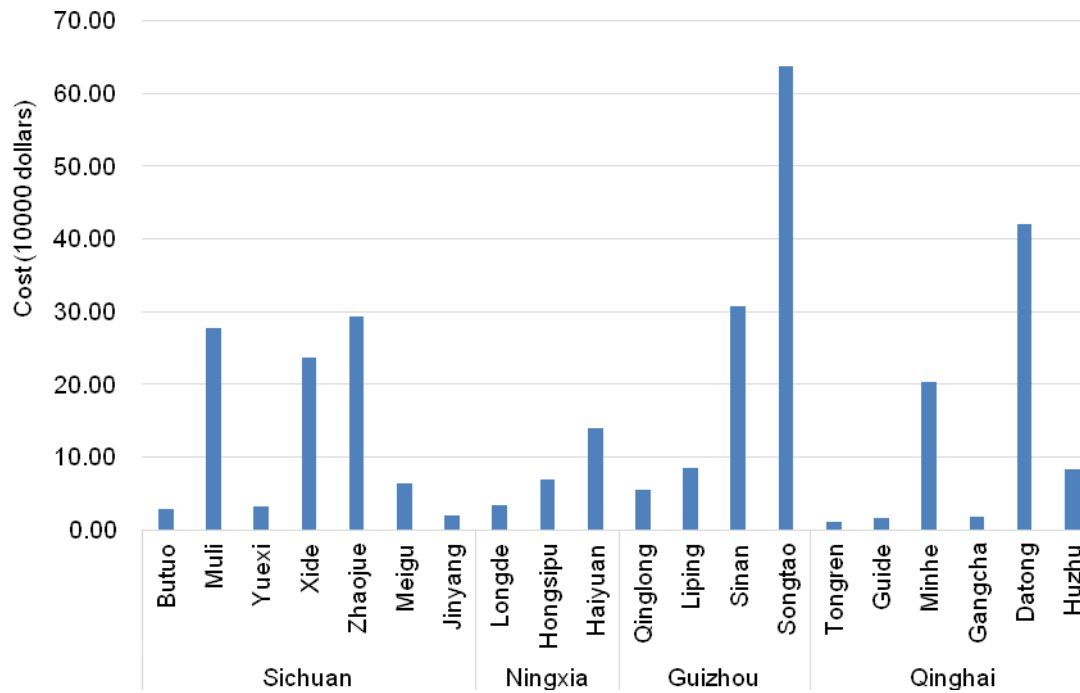


Figure 4 - 37 Accumulative total direct costs of implementing 7 core interventions in 20 pilot counties

The total cost of implementing all the 14 interventions in the 20 counties is \$ 11,162,390 (Figure 4 - 38). The lowest cost is \$ 76,435 in Tongren county of Qinghai province, while the highest cost is \$ 3,393,907 in Songtao county of Guizhou province. Population size and baseline coverage rate are the main causes of this huge cost gap.

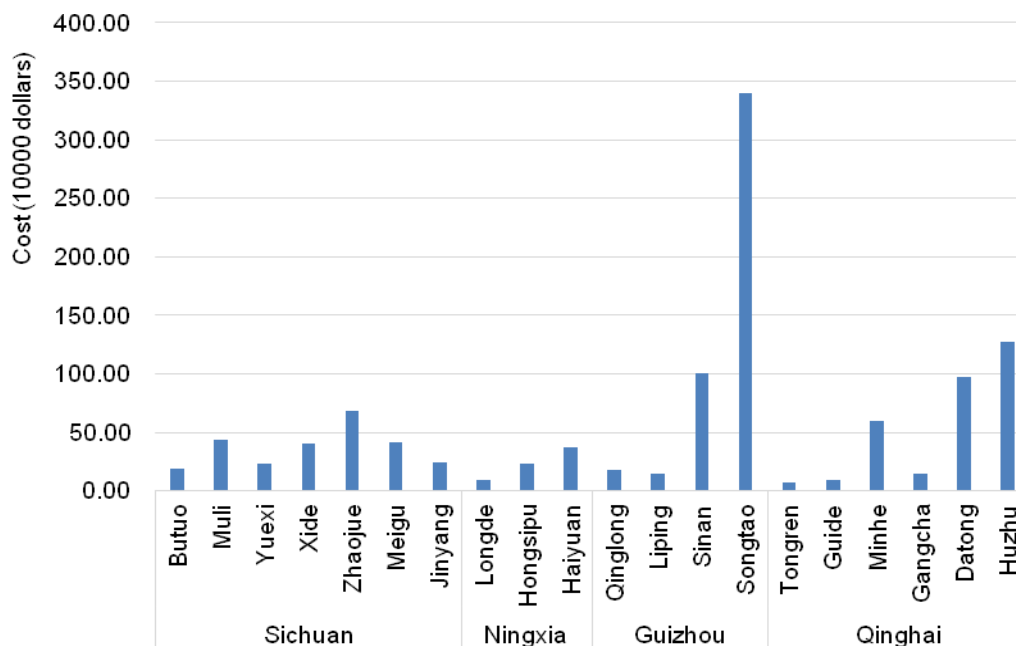


Figure 4 - 38 Accumulative direct costs of implementing 14 interventions in 20 pilot counties

Personnel costs of 4 years' implementation of all 14 interventions in 20 pilot counties are \$ 11,435,572 on average (Figure 4 - 39). The lowest cost is \$ 42,091 in Tongren county of Qinghai province, while the highest cost is \$ 3,337,963 in Huzhu county of Qinghai province. Besides population size and the target population, per hour cost of personnel is the main driver of the cost variation.

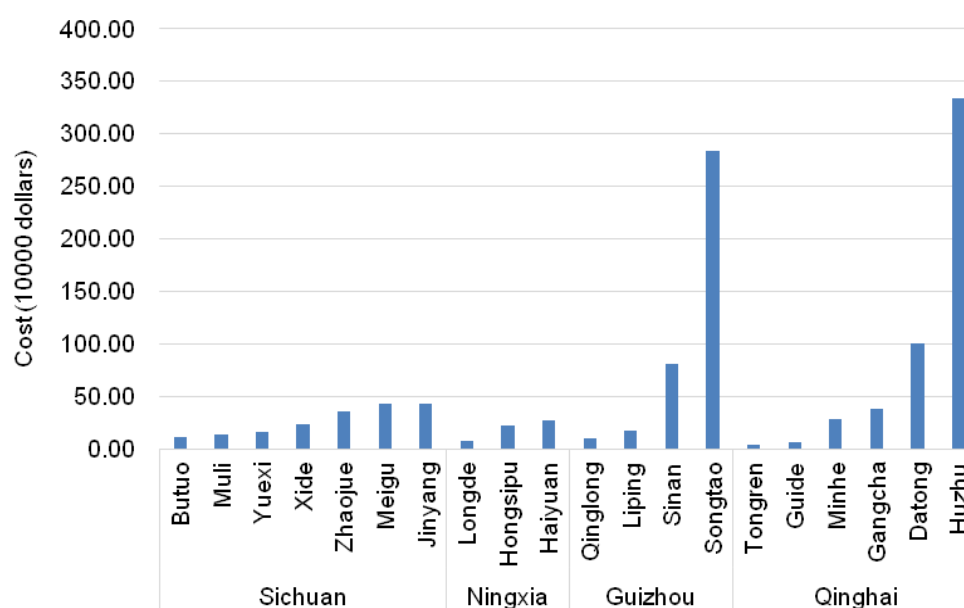


Figure 4 - 39 Accumulative total direct costs of implementing 14 interventions in 20 pilot counties

Average per case costs in county hospital of all 14 interventions in 20 pilot counties are shown in (Table 4 - 26). Cost of newborn eye prophylaxis (erythromycin ointment or 2.5% povidone iodine eye drops) is the lowest (2.39 Yuan), while cost of hypertension disorder case management is the highest (218.35 Yuan).

Table 4 - 26 Unit cost in county hospitals

Interventions	Costs (US dollars)
Neonatal resuscitation (institutional)	9.30
Delayed umbilical cord clamping	3.64
All breathing newborns receive immediate skin-to-skin contact for at least 90 minutes	6.47
Newborn eye prophylaxis (erythromycin ointment or 2.5% povidone iodine eye drops)	0.34
Newborn muscle injection of Vitamin K	1.54

Breastfeeding counseling and support	0.75
Kangaroo mother care	6.57
*Syphilis detection and treatment (pregnant woman)	3.68
*Labor and delivery management	25.10
*Daily iron and folic acid supplementation (pregnant woman)	4.21
*Hypertension disorder case management	31.44
*Antibiotics for pPRoM	11.50
*Active management of the 3rd stage of labor	4.88
*Neonatal sepsis - diagnosis and treatment	31.05

② Effect estimations

With year-on-year expansion of coverage, the implementation of 14 interventions in 4 provinces will contribute to gradual reduction of maternal, newborn and child mortality rate. According to the modelling, the accumulated effect of 4 years' implementation of all 14 interventions in 4 provinces are shown in Table 4 - 27. In total, deaths of 3,772 children under five could be averted, which includes 3,419 newborns. The lives of 332 women could be saved (Table 4 - 27).

Table 4 - 27 Accumulative effect of implementing 14 interventions in 4 pilot provinces

Indicators	Sichuan		Ningxia		Guizhou		Qinghai	
	2017	2020	2017	2020	2017	2020	2017	2020
NMR (‰)	3.49	2.59	5.05	3.46	4.52	3.1	6.7	4.59
IMR (‰)	7.29	6.29	7.18	5.52	7.88	6.34	9.7	7.49
U5MR (‰)	10.5	9.56	9.24	7.58	10.91	9.37	11.98	9.77
MMR (/10000)	33.5	22.23	19.98	12.75	27.25	17.38	31.53	20.12
Newborn deaths averted	1672		158		1323		266	
Child deaths averted	1888		165		1441		278	
Maternal deaths averted	214		8		95		15	
Total deaths averted	2012		173		1536		293	

Note: NMR: neonatal mortality rate; IMR: infant mortality rate; U5MR: mortality rate of under-five children; MMR: maternal mortality rate.

Average reduction rates of maternal mortality rate in 20 counties are shown in Figure 4 - 40. The lowest reduction is 0.17% in Longde county of Ningxia province, while the highest is 48.39% in Guide county of Qinghai province.

The average reduction of maternal mortality rate in 20 counties is 22.82%. The different reduction rates were possibly due to the variations of baseline coverage and target coverage rates. Target coverage is much higher than baseline coverage, will result in a high reduction rate.

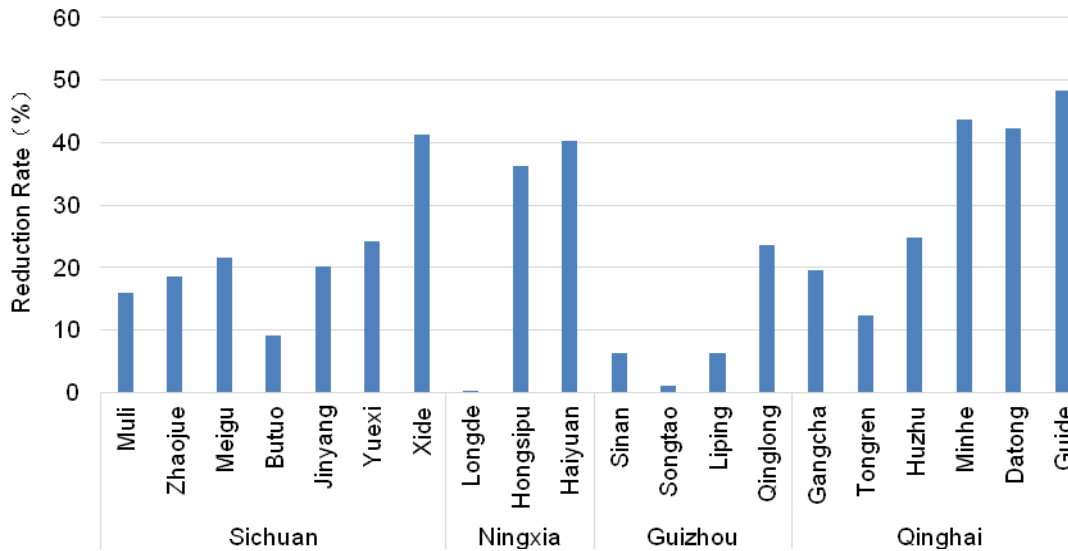


Figure 4 - 40 Average reduction rate of maternal mortality rate in 20 counties

Average reduction rate of neonatal mortality rate in 20 counties are shown in Figure 4 - 41. The lowest reduction is 6.51% in Muli county of Sichuan province, while the highest is 36.27% in Hongsipu county of Ningxia province. The average reduction of maternal mortality rate in 20 counties is 19.25%.

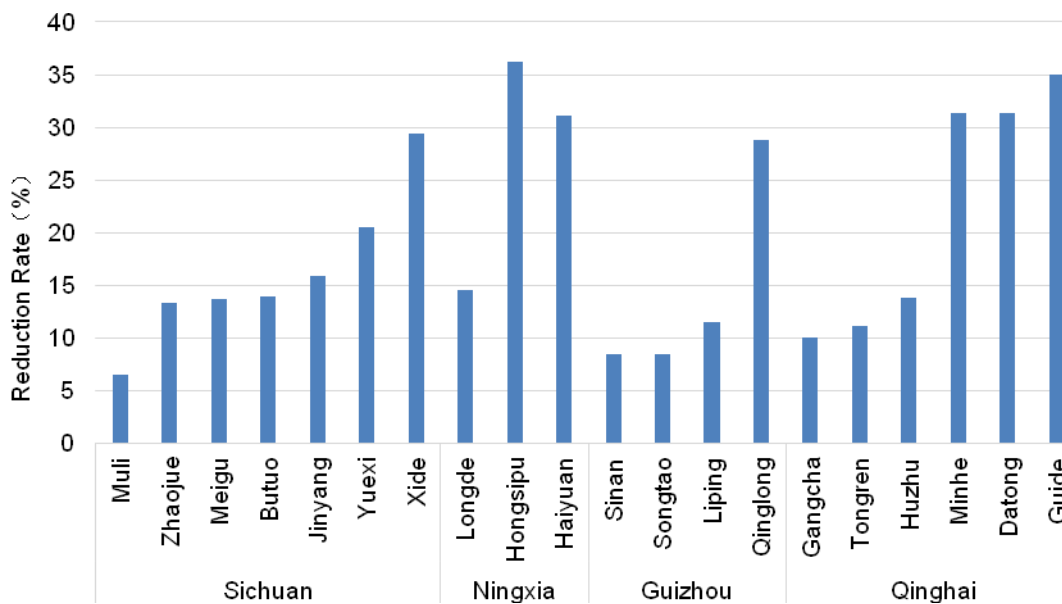


Figure 4 - 41 Average reduction rate of neonatal mortality rate in 20 counties

③ Cost-effectiveness analysis

The evidence on effectiveness is missing for 4 newly included interventions, namely delayed umbilical cord clamping, all breathing newborns receive immediate skin-to-skin contact for at least 90 minutes, newborn eye prophylaxis (erythromycin ointment or 2.5% povidone iodine eye drops), and newborn muscle injection of Vitamin K. as a result, only 10 interventions were included for cost-effectiveness analysis. Effect of 10 interventions in Guizhou, Ningxia, Qinghai, Sichuan Province are shown in Figure 4 - 42, Figure 4 - 43, Figure 4 - 44, Figure 4 - 45).

Kangaroo mother care is listed as the most cost-effective intervention in all provinces but Guizhou, where neonatal resuscitation (institutional) is the one. Case management of hypertensive pregnant women is the least cost-effective interventions in all but Ningxia Province. Kangaroo mother care, breastfeeding counseling and support, and neonatal resuscitation are the ones with better cost-effective across the localities.

For the same intervention, the costs per death averted varied greatly due to differences in medical prices. Generally seen, labor-intensive interventions (hypertension management) were more costly than simple interventions as kangaroo mother care.

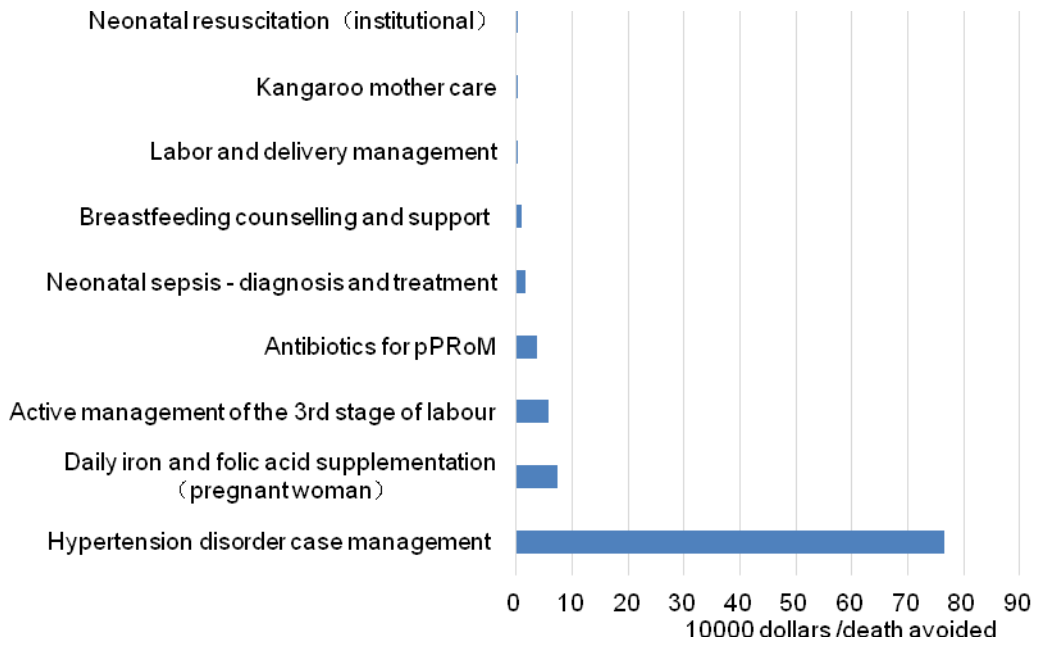


Figure 4 - 42 Cost-effectiveness of 14 interventions in Guizhou Province

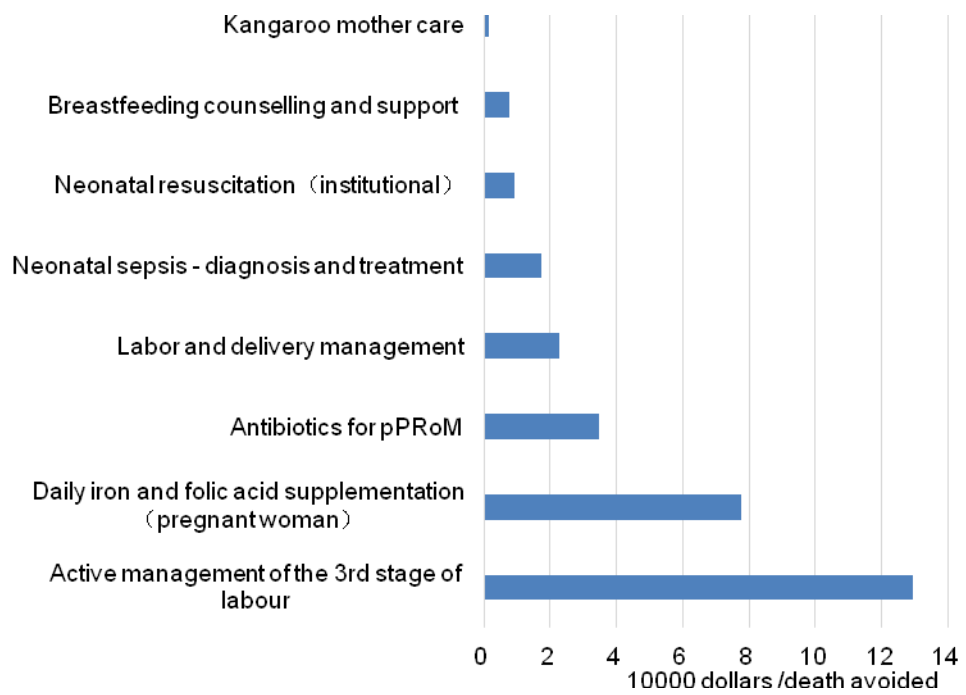


Figure 4 - 43 Cost-effectiveness of 14 interventions in Ningxia Province

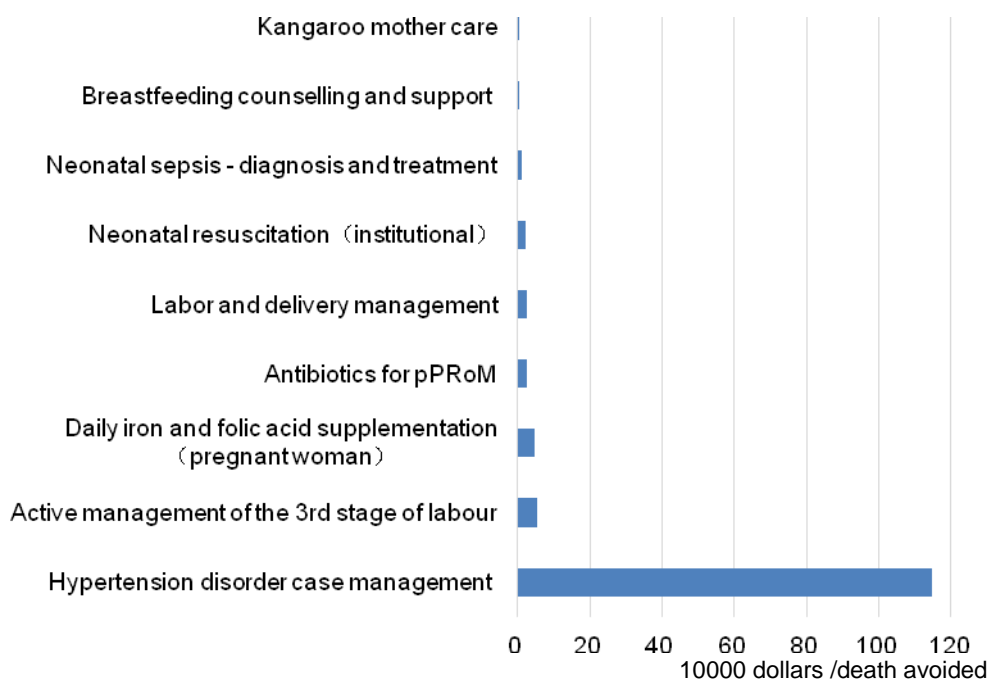


Figure 4 - 44 Cost-effectiveness of 14 interventions in Qinghai Province

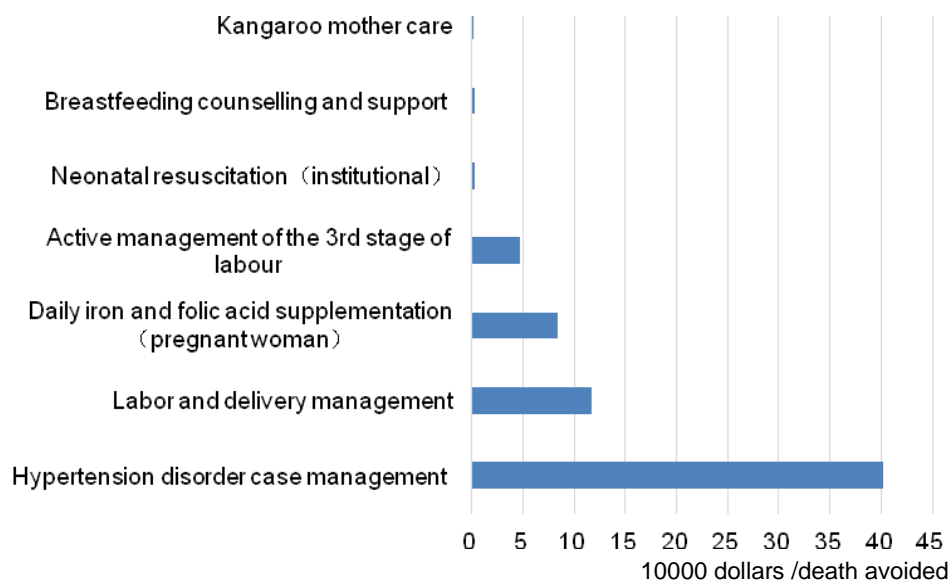


Figure 4 - 45 Cost-effectiveness of 14 interventions in Sichuan Province

④ Other resource gaps

Medical personnel with the greatest demand for human resource in 20 counties is shown in Table 4 - 28. Medical personnel in highest cost and the total personnel cost is shown in Table 4 - 29.

Table 4 - 28 Health personnel in the greatest need and the total working hours needed

		Medical staff in the greatest need	Total working hours
sichuan	Butuo	Laboratory technicians	14,715
	Muli	Laboratory technicians	14,531
	Yuexi	Laboratory technicians	5,945
	Xide	Laboratory technicians	21,850
	Zhaojue	Laboratory technicians	79,247
	Meigu	Pediatric nurse	36,296
	Jinyang	Pediatric nurse	50,268
Ningxia	Longde	Pediatrician	2,932
	Hongsipu	Laboratory technicians	63,431
	Haiyuan	Pediatrician	18,835
Guizhou	Qinglong	Midwife	14,435
	Liping	Maternity nurse	16,910
	Sinan	Midwife	138,820
	Songtao	Accoucheur	144,545
Qinghai	Tongren	Midwife	6,934
	Guide	Midwife	4,821
	Minhe	Midwife	19,939
	Gangcha	Laboratory technicians	33,135
	Datong	Laboratory technicians	134,662
	Huzhu	Pediatric nurse	399,821

Table 4 - 29 The category of health personnel at the highest cost

Province	County	personnel at the highest cost	total cost (10,000 dollars)
sichuan	Butuo	Laboratory technician	4.74
	Muli	Laboratory technician	4.75
	Yuexi	Laboratory technician	5.14
	Xide	Laboratory technician	7.49
	Zhaojue	Laboratory technician	15.62
	Meigu	Pediatric nurse	18.67
	Jinyang	Pediatric nurse	15.51
Ningxia	Longde	Pediatric nurse	2.29
	Hongsipu	Laboratory technician	14.14
	Haiyuan	Pediatrician	7.43
Guizhou	Qinglong	Maternity nurse	7.83
	Liping	Maternity nurse	5.07
	Sinan	Midwife	50.43

Qinghai	Songtao	Pediatric nurse	172.65
	Tongren	Midwife	1.55
	Guide	Laboratory technician	1.51
	Minhe	Laboratory technician	6.75
	Gangcha	Laboratory technician	24.86
	Datong	Laboratory technician	56.88
	Huzhu	Pediatric nurse	166.03

(5) Stakeholders and their responses

3 groups of stakeholders were identified through the initial stakeholder analysis exercise, namely, policy makers (mainly health bureaus at city/prefecture and county level), implementers (project coordinators, presidents of pilot hospitals, care providers), and service users (pregnant women, newborns and their family).

Overall attitudes. A questionnaire-based survey on policy-makers and key implementers in the pilot sites were conducted (n=35) in a project meeting in March 2017. Policy makers in the pilot counties and provinces held positive attitudes to the pilot, with confidence in achieving the expected health outcomes. 95% of respondents recognized the importance of the pilot and considered it in line with local MCH priorities and policy frame. However, 71% respondents thought it difficult to implement the pilot program. Some providers concerned about the potential increase of their workload, and negative reaction from and possible risks to patients.

Key factors for successful implementation. Service capacity, politicians' attention, additional investment, and policy support are the key factors that will influence pilot implementation. In Figure 4 - 46, each bar represents a key factor, and the percentage of respondents who have voted for the factor is shown.

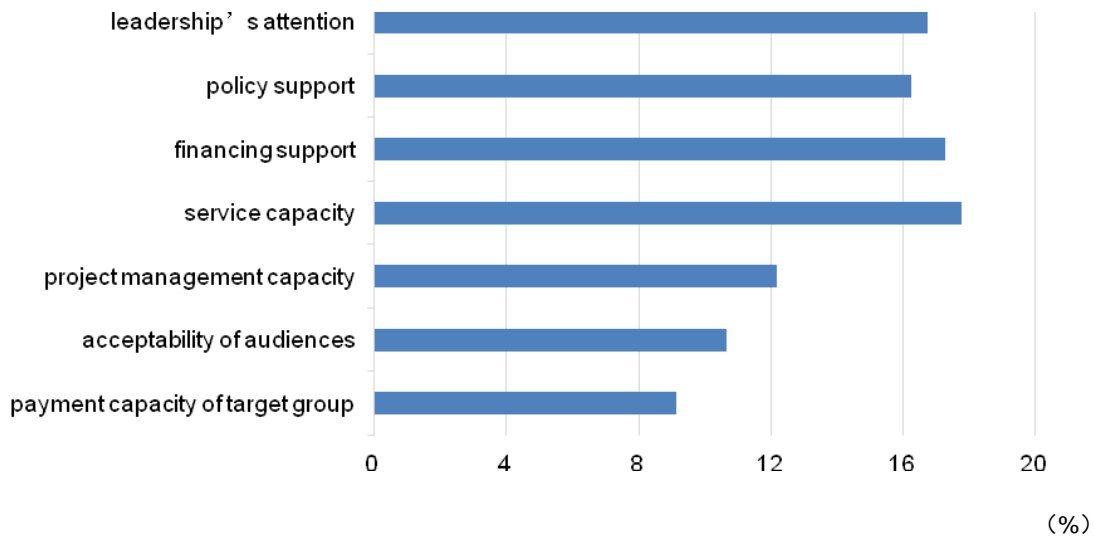


Figure 4 - 46 Key factors that will influence pilot implementation

Local demands. Favorite policies, capacity building, financial investment, care quality, management skills, and health education were selected as main areas of support. Some common support named by the respondents include more funds for provincial and county level project administration, more human resource and professional training, special human resource policies for poor minority areas, and reforming financing mechanisms for MCH care (Figure 4 - 47).

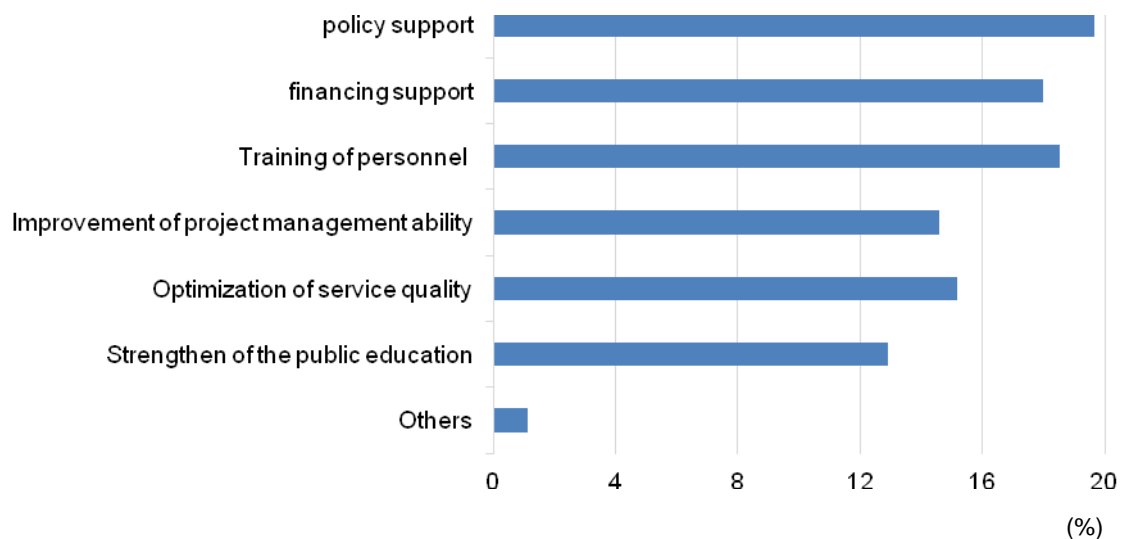


Figure 4 - 47 Anticipated need for pilot implementation

A questionnaire-based survey on policy-makers and key implementers in the pilot sites were conducted (n=54) in the project kick-off meeting in September

2017. It aims to investigate the local policy-makers and implementers' feedback on the baseline study results. 80% policy-maker and 100% implementer considered that the study results accord with their local MCH system and neonatal situation.

Problems and bottlenecks of maternal and child health system have been selected as the most relevant and valuable content for local project design by policy-makers. Neonatal health condition analysis, cost and financing analysis and policy suggestions are next after that. Implementers selected neonatal health condition analysis and problems and bottlenecks of MCH system as the most relevant and valuable content (Figure 4 - 48).

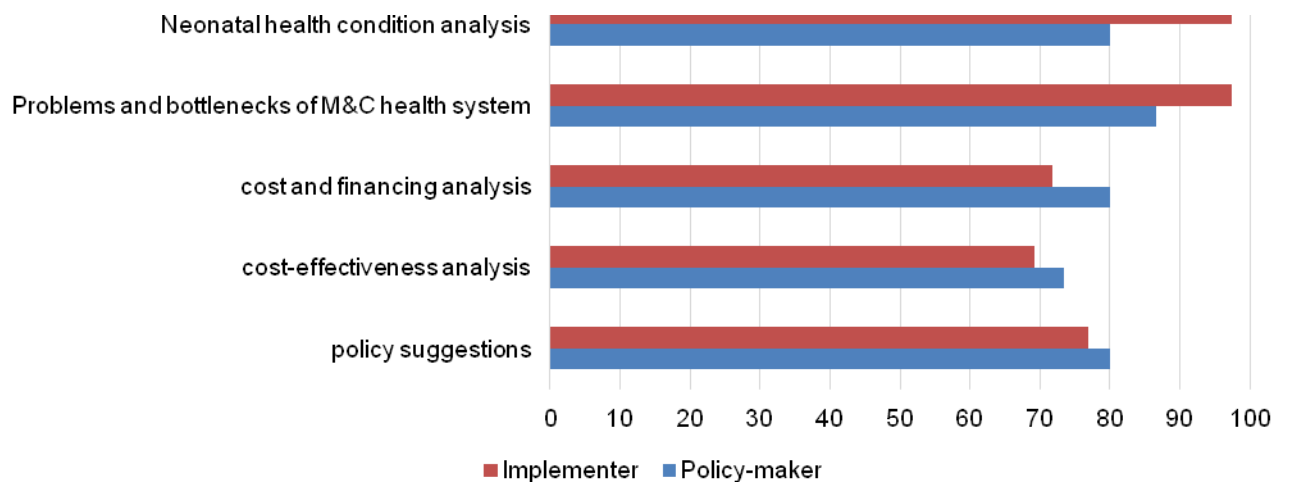


Figure 4 - 48 The most useful evidence and knowledge in the situational analysis

Almost 87% policy-maker have more detailed data and analysis demand on problems and bottlenecks of MCH system, which is 13% higher than implementers. Implementers were more concerned with the cost and financing analysis (Figure 4 - 49).

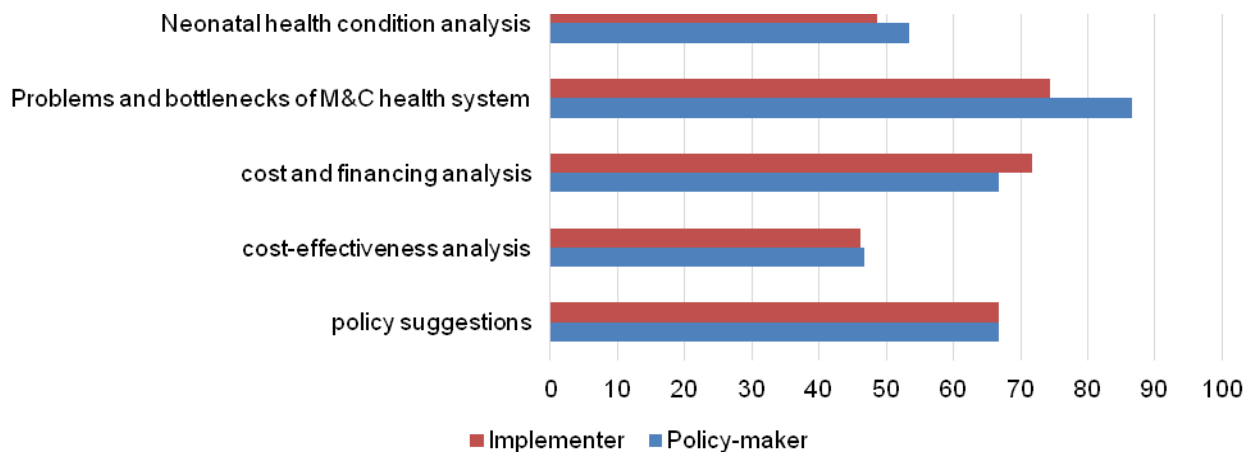


Figure 4 - 49 Future research and evidence needed

Capacity building, health financing analysis, recommendations for programme management were selected as top 3 areas of support by policy-makers. Capacity building, high impact interventions selection and implementation pathway analysis were selected as top 3 areas of support by implementers (Figure 4 - 50).

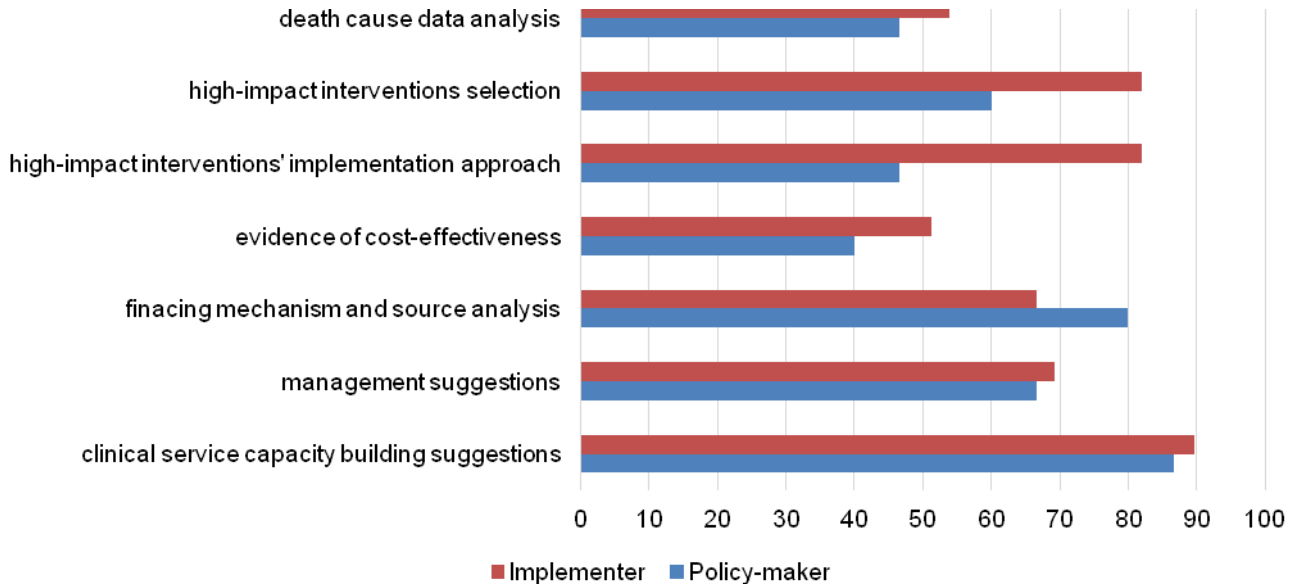


Figure 4 - 50 Further support demanded for pilot implementation

4.4.5 Discussions

Neonatal survival is a priority area for China. In the context of Healthy China 2030, UHC and SDGs, the neonatal survival and development is of particular significance. The paper documented the situational analysis of a large Chinese national pilot program, and the researchers combined different analysis together to provide evidence and knowledge of further local decision-making and program planning.

The situational analysis has pooled evidence from different sources that might be demanded by the local decision-makers—MCH policy makers and project implementers (project coordinators, health managers and care providers). It brought together evidences on analysis of contextual factors, disease burdens and priorities, bottlenecks of service delivery, costs and effect estimations, stakeholder attitudes and reactions, etc. Through presentation of the analysis results, potential gains, risks, and key elements of implementing 14 high impact interventions recommended by the WHO and UNICEF have been explored.

The whole approach to the situational analysis reflected the basic assumptions of the researchers. Firstly, MCH service delivery in local settings is a complex process, multiple health and non-health factors may influence it, such as quality and quantity of evidence and attitudes of various local stakeholders. Secondly, existing system-level problems would have potential impact on the program implementation, such as local health infrastructures and overall MCH service capacity. Thirdly, local priorities and interventional strategy need to be determined on the basis of close examination of the whole care delivery system in a particular political, socio-economic, geographic, and cultural context.

In contrast to the methods of previous research, this study stressed on the costing and cost-effectiveness of scaling up the target interventions in the pilot areas during the project years, to provide the local planners and decision-makers with findings on the financial gaps and extra resources. In the context of UHC, financial sustainability of the interventions surely will be a main consideration for the pilots. The researchers moved one step further by

analyzing provincial rollout and its costs and impact, supporting the provincial decision-makers in conducting evidence-based project planning and supervision.

The following findings from the situational analysis call for attention:

Firstly, health piloting in a complex and rapidly changing situation needs to address multiple factors, including some non-health or extra-systemic factors. MCH is not only influenced by health system factors such as health resources and delivery capacity, but also by socio-economic, geographic and demographic factors. Entangled health and non-health factors may have a negative impact on the implementation process as well as outcomes. Different localities may have different priorities, implementation settings, stakeholders, and the costs and expected gains may vary, too. Therefore, SNP project needs focused and detailed plans at local level, taking full considerations of potential risks, barriers, resources, and reactions and attitudes of key actors.

Secondly, the design of the local pilot program needs various information and evidence input, as well as full cooperation between local, provincial and national actors.

Thirdly, different localities should choose interventions based on local disease burdens and resource available, though Kangaroo mother care, breastfeeding counseling and support, and neonatal resuscitation are have better cost-effectiveness across all the localities. However, the prioritization might be inaccurate due to missing data.

Fourthly, key stakeholders welcome the project, though they commonly share some concerns, such as increasing workload and resistance from service users. They believe policy support, financial investment, capacity building and other system strengthening efforts will contribute to successful implementation of the project. They also ask for project-specific support, such as staff training and public education.

Further research is called for. Based on the current neonatal care financing and projection of costs and effect, more fine-tuned analysis is required to supply the local decision-makers with more concrete evidence. All the economic analysis is based on the assumption that the local care provider can deliver the care with due quality and the target user can utilize the care. However, previous context analysis showed that multiple factors may influence the care delivery and utilization. The actual effect of the intervention needs to be studied through carefully designed evaluation studies.

4.4.6 Conclusions

Neonatal care is a national priority in China now. The implementation of SNP is a national pilot on delivering high impact neonatal interventions to those living in the underdeveloped and underserved remote rural counties. Through the analysis, multiple aspects of pilot implementation were examined, including potential costs, effect, resource gaps, barriers, and facilitating factors. The study firstly introduced OHT-based analysis in situational analysis, and innovatively triangulated all sources of data and information to meet planners' need for evidence. Although missing data and economic assumption slightly undermined the usefulness of the findings, the local decision-makers and implementers may still benefit from this panoramic view of the local situation where the pilot will be introduced.

Chapter 5: Conclusions

The thesis focuses on the Chinese government's learning capabilities and examines meta-learning as sources of such learning capabilities with analysis of a handful of cases from the Chinese health sector. From a perspective of a national health think-tank, it chooses to answer the following 3 questions:

- 1) What is the main mode of policy meta-learning in China?
- 2) What are the main tools for the meta-learning?
- 3) What role does the thinktank play in the learning?

The first question has been split into 3 detailed questions and answered in the chapter 2 and 3. The chapter 2 answers the question about the nature of the meta-learning process, and deals with the level of learning (individual, organizational, or system level), learner and teacher, and main contextual factors. The chapter 3 describes how the meta-learning take place and the learning outcome achieved.

The chapter 4 discusses the question 2 and uses 4 cases to demonstrate methods and tools that are key for supporting the policy meta-learning.

Although the last research question about the role of the thinktank is not directly dealt with, but the answer can be drawn from the previous chapters and all the 8 case studies conducted by the CNHDRC. In other words, the fourth question is cutting through all the analysis so far.

To effectively present the conclusions, the next section reviews all the cases and key messages targeting the 4 research questions. Table 5 - 1 shows the 8 cases in 3 chapters and key messages delivered towards answering the research questions. The think-tank's role is discussed for each case in

Table 5 - 2.

5.1 What is the mode of the policy meta-learning in China?

5.1.1 What is the nature of the policy meta-learning?

Using an insider's perspective, the thesis examines the nature of the policy meta-learning in China. As showed in the introduction, learning plays a key role in supporting iterative and evolutionary decision-making in China, and the ideology in the country shows an ever-increasing importance attached to enhancing learning abilities of policy learning. Incremental and experimental approach to policymaking has proved to be effective way of managing socio-economic reforms in highly uncertain and complex context. The thesis captures the main characteristics of the Chinese reforms to UHC in the health sector and argues that such policy approach has an innate call for learning and innovation.

In a complex health system, learning and innovation is fundamental to health reforms and system strengthening. On its way to UHC and facing unknown challenges from radical concurrent health reforms, the Chinese government forms a top-down experiment- and experience-based approach to health policy making and implementation — “feeling the stones while crossing the river”. For instance, in its ambitious trial on reshaping domestic medicine market and achieving best buy for implementing UHC, China launches centralised drug procurement reform in 11 cities as phase one experiment. As analysed in the first case in chapter 2, working from the grand policy and regulatory framework set out in the national policy, local governments in these pilot cities are supposed to develop local solutions to fill in as details of these policy framework. Without timely evaluation and learning, quick and hurried actions may be prone to random failures in dealing with such complex issue

as generics procurement in a poorly regulated and monitored medicine supply system. The case is a review by the CNHDRC researcher, and leaves interesting unanswered question in the end—what could happen next with or without careful research and evaluation? The case recommends for turning to the newly developed health technology assessment system for systematic evidence support for the procurement reform. This is a meta solution for improving policy learning in this particular case.

The thesis shows a degree of institutionalisation of evaluation and learning in the Chinese reform/piloting process. Strong government backing of the case studies conducted by the national thinktank helped increase the legitimacy of the research process and build trust among various policy actors. In the health sector, learning and innovation has supported rapid and complex health decision-making, and the national thinktank CNHDRC played a big role in facilitating the policy learning process. By undertaking research activities like field visits and engaging actors in reflecting on the policy/reform, the CNHDRC helped to create feedback loops and new flows of information, and build systemic reflexivity. The government's readiness to accept and use imperfect evaluation findings reflects the nature of decision making that attempts to learn from limited inferences to make rapid decisions.

More importantly, the CNHDRC has been adopting and adapting new tools to meet the learning need of the government. Single-loop and double-loop learning happens in spaces created by research and evaluation activities. Learning from widespread innovation and experimentation is challenging, but necessary for stewardship of large, and rapidly-changing systems. More importantly, the researchers and evaluators themselves test and learn about new methods in process (deutero-learning). Such need and approach to deutero-learning is formalised in current State Council's policy on encouraging the development of new-type of thinktanks, and call for all the policy-makers to learn through investigation and research. The thesis demonstrates that the Chinese health policy-making has developed the meta-learning approach with the support of the thinktank.

The thesis also shows that single- and double-loop learning at individual, organisational and systemic levels can and should happen in one go to create favorable changes and innovations. For the Chinese government, it is not only concerned about the progress and outcome of a specific policy/reform, but cares more about whether there is no fixed as teacher or learner in the meta-learning process. The policymaker and government might be the target learner in policy learning; however, the learning has never meant to be one-way. The existence of policy experts in the field visit in the second case of the chapter 2 shows that they could teach the implementation units about the key purpose and principles of the grand and broad policy framework or reform plan. The thinktank itself was learning and facilitating learning through delivering research activities. The researcher learned the local realities and reflected on the learning process (evaluation and research) and relevant tools. In such a vibrant learning process, learning capabilities of all key policy actors have enhanced, and learning by individuals, organizations and systems achieved.

5.1.2 How does the meta-learning take place in a situation of rapid changes and complexity?

The thesis also examines how the learning about learning process itself happens in rapid changes and great complexity. Chapter 3 studies conditions and methods of the learning, such as use of data and research, end-user participation, learning through communication and interactions, and "learning by doing" etc. Three cases present the main methods of the learning and discuss the context in which learning happens. It shows that the meta-learning happened in a context of rapid socio-economic transitions and complexity. With great uncertainty, such experimental and adaptive meta-learning shows its greatest value in supporting and sustaining continuous policy refinement.

The main learning mechanisms, as shown in previous chapters, are mainly use of data and research as well as the design and organisation of the

evaluation activities. Complexity lens, realist perspective and utilization focus are key features of the new type of evaluation approach.

For instance, in the evaluation of the essential drug policy, the research team recognised the complexity reform design as well as the conducted evaluation of the initial progress and outcomes (single-loop learning), and realised there was unexpected outcome and great deviation in implementation. They fell back to examine the program theory of the reform against the initial outcomes (double-loop learning). In order to strengthen their ability for achieving the double-loop learning, they adopted a new approach to evaluation — *developmental evaluation*. The complexity lens lent by the new approach supported their capture of the local realities and enriches the understanding of the program theory. The case gave a full account of how the learning of learning (single- and double-loop learning) takes place, as well as the local context of such learning. Complexity and rapid changes are the main features of local contexts, where multiple actors, visible and invisible in the policy scene, may react and influence policy implementation. In the case of the evaluation of the five-year national health plan (2011-2016), the CNHDRC team trialed a utilisation-focused evaluation approach, engaging the policy-makers in framing policy questions and priorities, and making the results more tailored to the policymaker's need. This is not only an innovative experiment of the methodology, also a rethinking of conventional policy-research relationship in the country. The success of the experiment demonstrates the openness of policy and research community to the learning of new methods and tools. In the evaluation of the public health service package, the researchers engaged multiple stakeholder groups in designing and implementing explicit priority-setting process and relevant methods and tools. They employed MCDA to keep a transparent and open disinvestment decision-making process, and used HTA and other conventional research methods (field study and questionnaire) to generate the anticipated evidence. In the whole process, the researchers played an active and dominant role. However, findings produced by such a complete research process and sound methods encountered hardships and failure in the end. This case reminds us that good policy design depends on the interplay of analytical, managerial,

and political capacities (Wu et al. 2017). That is to say, improving of research and analytical competence may not be adequate for designing a whole new priority setting policy. More political and managerial thinking is required to enhance the learning abilities. This is precondition for such meta-learning in complex systems.

The thesis provides a clear picture of the learning interfaces and conditions. CNHDRC's formal role in supporting policy learning enables its probe into the local information and realities. Its open embrace of new methods and approaches is key for steering and facilitating the learning process. However, learning is never a single-sided activity, and effective learning requires collaboration and engagement of key policy actors, especially on the part of policy-makers. From the methodology adaptation and evolution, we can see the CNHDRC's continuous efforts in introducing and adapting methods in the local context. The thinktank's unique role in supplying evidence to decision-making enables it to testify and examine usefulness of various methods and tools. Utilisation-focused evaluation, developmental evaluation, and realist evaluation are evaluation methodologies new to China as well as some other parts of developing world. HTA and MCDA are also new tools for generating evidence needed for policy making. The iterative and evolutionary policy process requires for active and open trial of various methods of studying and improving the learning. In the national and subnational learning spaces created by national pilots and experiments, the thinktank is learning about the methodology through evaluation and research activities.

5.1.3 What learning outcome is achieved?

Building on the previous two questions, the section discusses the findings of the specific question about the learning outcome of policy meta-learning in the health sector. Chapter 2&3 show that with institutionalising learning and evaluation, the thinktank supported the government and implementation units at various levels to gain capabilities in making more informed decisions.

The policy meta-learning supported by the CNHDRC in the health sector

contributed to both single- and double-loop learning. In rapid changing environment, semi-open or open reform policies are expecting local innovations and learning. The Chinese government is concerning more than judging the progress or outcome of a reform or policy (single-loop learning), but more interested in knowing why or why not a program was implemented successfully in the particular local situation (double-loop learning). The genuine interest to the change theory of a given reform or policy drives the researchers to examining the underlying program theories and paying more attention to external validity issues like what and how to scale up lessons learned.

From the grand national plan like the 12th Five Year National Health Plan (2011-2015), to specific reform program like the essential medicine policy and public health service package, the methodologic approach to policy learning has adapted and evolved along with the changing policy scene. Enhanced capability has been documented, not only on the part of the researchers, but key policy actors, such as health planners, health managers and professionals, and other policy researchers.

5.2 What methods and tools can effectively support the meta-learning?

The thesis examines the specific methods and tools trialed by the CNHDRC in approaching different policy questions, from capital funding of costly equipment and market withdrawal of essential drugs, to priority setting of maternal and child health resources. Based on the case studies, we can see quite a range of methods employed, including conventional ones such as literature study and field survey, as well as new ones like MCDA and rapid HTA. These methods and tools are usually employed in certain combination and consecutive order. It shows the distinctive underlying methodological approach. For instance, in the first case of chapter 4, the CNHDRC adapts the Ottawa Hospital Research Institute's rapid review method and develops its approach to rapid HTA of drug and medical device. The research method is contextualised, and combined with extensive expert consultation and use of local data and parameters. In this way, the research findings are more acceptable and communicable to the policy process. The same approach is adopted in the later 3 cases, which are about the same policy topic—priority setting in maternal and child health. The CNHDRC team learned and adapted priority-setting tools, such as CHNRI and OHT by applying them in solving real policy questions. A similar “learning by doing” approach was taken by the researchers to make the tools more suitable and applicable in supporting policy learning. To gain more insights into the local situations, the researchers did literature review and field visits, and consulted local and national experts extensively. Such approach supported the methodological learning and translation. For the national and subnational policy actors such as policy-makers and their experts and implementers at different levels, they were not passive subjects of evaluation or detached end user of the evidence, but active co-learners and partners of the method learning and application. Such an organisation of learning gives the method best chance of being appreciated and accepted by the policy makers and implementers. Based on the President Xi's learning ideology, ubiquitous policy learning is all inclusive

in terms of content—learning from books, experts, international experiences and practices, etc. With more openness to learning on the policy-maker's side, the researchers have more chance of innovating methodology by practising it with the policy actors together. As shown in the 4 cases, such learning takes place in all stages of policy making, from research stage, to policy making and implementation stage, as well as to evaluation stage. Its impact increased and reached the climax in the situational analysis of the national newborn care pilot in 20 counties. The CNHDRC team designed and implemented the research in a hope of providing targeted evidence for implementation planning. Multiple stakeholders were identified, their views collected besides cost-effectiveness analysis and bottleneck analysis. Active engagement of target users and beneficiaries in the planning stage of policy implementation demonstrated the researchers' serious interests in reciprocal learning about the evidence need and methodology. This learning happened at individual, organisational, and service level. By the time of the thesis writing, learning outcomes are shown. We can see better selection of pilot sites at provincial and county level, selection of priority interventions at county level, intensive training at facility-level, and more appreciation of M&E efforts at all levels. A comprehensive system-wide learning network is formed with the support of the researchers and the research activities. The pragmatic and action-based methodology to is supporting evidence-based policy making in the program context.

Based on the analysis, we found that old and new methods and tools are usually applied in a combined mode to approach various policy problems in different policy-making stages. The combined methods showed a methodology distinctive in its own way. It always had a key component of situational or context analysis, which helps the researchers to understand the specific policy making and implementation context, mostly through field survey or interview of key stakeholders. In this sense, the learning is adaptive to the local context. Influenced by a utilisation-focused and developmental evaluation approach, it stressed on continuous engagement of end-users and other potential users of the research evidence in the research process. The combination of methods is becoming complicated when the researchers were

dealing with more complex policy issues, such as implementation of the high impact interventions. The research process itself made continuous adaptation as found with the situational analysis of the implementation of the newborn interventions in 20 rural counties, reflecting the active adaptation of methodological learning to patterns of conditioning in relationships in contexts.

5.3 What role does the think-tank play in the learning?

In an increasingly complex world, policy problems are ill-structured, which makes effective learning difficult. From all the cases presented, we identify the important role played by the national thinktank. The CNHDRC has a mandate mission in providing evidence for health decision-making. It fulfilled the role through conduct of research and evaluation. All the case studies included were done by the CNHDRC researchers. In almost all cases, it served as the designated evaluative team, examining results and outcomes of reforms, and supporting central policy making or local implementation.

As a trusted probe, the CNHDRC has been commissioned to learn local situations, identify best practices, summarise key lessons, and review program theory of health reforms. In all the cases, the CNHDRC researchers not only played the role of evaluators and researchers, but also learners and learning facilitators. They needed to learn new methods to better fulfill their role as evaluators and researchers. In complex health systems, where emergent behaviors are common and control is impossible, they needed to invent a new approach to adapt to the changing needs of the decision-making.

Furthermore, the thinktank had more active participation in policy-making process by shaping the need of the decision-making. For instance, they helped to set research priority of the maternal and child health service, supported the selection of high impact interventions, and then supplied evidence for intervention implementation. A chain of evidence has been developed and geared to provide coherent knowledge for policy making and implementation.

As the thesis argues, the institutionalising of learning and innovation is key mechanism of policy meta-learning in China. The thinktank's role in learning and innovation has been stated in the central government's recent policy. This indicates that the policy process has accommodated this type of policy meta-learning mechanism. For the CNHDRC, its newly designated role of the

national HTA agency is the best proof of the institutional arrangement for the policy meta-learning.

The thesis notes that there might be danger for the thinktank to overdo the policymaking supporting, as described in the disinvestment of the public health service package. It reminds us that there is still a need to develop a systematic evidence-based decision-making process in China. Further study needs to be conducted by the CNHDRC to improve the quality and utility of its role in facilitating such decisions.

5.4 What can be learnt about the Chinese meta learning experiences?

COVID-19 is striking the world when the thesis reaches the final conclusion. The pandemic teaches peoples about how vulnerable and naïve we are in dealing with unknown disease, and what disastrous results can be produced when the government makes wrong decisions. In dealing with the pandemic, China's swift response and decisive policy-making has impressed the world. There must be some sharable lessons about this peculiar learning and policy making approach in the country. As a final conclusion of the concluding part of the long thesis, it is worth exploring possible lessons about the Chinese approach to policy meta-learning and what it means for the world.

5.4.1 Implication to the policy learning studies

For the general literature on the policy learning, the findings of the thesis explain about how such experimental and reflexive learning of the Chinese government leads to change of the public policy, and fills the knowledge gap on how the evolutionary learning mechanism can be built and works empirically (Dunlop & Radaelli 2013, 2016; Zito & Schout 2009). The indigenous Chinese approaches to policy experimentation and learning are employed as a means of dealing with complexity. Out of the rejection of “one size fits all”, the government has taken an experiment- and experience-based approach — “feeling the stones while crossing the river” in the socio-economic and healthcare reforms. Learning has always been stressed as an important decision-making tool in the Chinese Communist Party's policy toolkit, as a natural response to the innate call of the evolutionary and adaptive policy making approach. In dealing with an ever-complex world, the government recently stresses on improving policy learning capabilities, and indicates a strong interest in methodology of policy learning. The thinktank's role is emphasised as well, to support policy learning and enhance policy capability.

Firstly, learning about the policy learning process is an important policy capability of the government, and will contribute to effective policy making and implementation. The Chinese government's serious learning intention and focus on improving learning capabilities can be regarded as part of the reason why it has seen rapid socio-economic development and avoided big risks and mistakes in the past decades. In the cases selected from the Chinese health sector, it is clear that the government has extensively employed the experimental policymaking approach or the "3 E" (experience, experiment, and expansion) approach to acting on big reform and development plans. Such an iterative and incremental approach not only allows for local trials and adaptation to the policy, but sustains and enhances the reciprocal learning between various policy actors. Therefore, the learning about the local policy learning process is key for the government to manage changes and support innovations in rapidly changing and complex environment. Even though the learning is not always coming straightforward, the strong intention and seriousness on the part of the government will sustain the incremental improvement of policy learning abilities.

Secondly, the meta learning supported by the thinktank and research institution can happen at any stage of policy making. The Chinese case studies show that the meta learning about the policy learning can happen at any stage of policy making, be it the research and planning stage, prior-implementation stage, or actual implementation and evaluation. In the government's learning process, the role of thinktank and research institution needs to be strengthened, not only for supporting the single-loop and double-loop learning, but also enhancing the meta-learning abilities of the government. The thinktank's role in policy making and learning needs to be formalised, and original trust in its probe's role needs to be established to enable the meta learning to happen. It can help improve methodology, and organise and facilitate learning.

5.4.2 Implication to the evaluation studies

Evaluating experimental reforms or innovations in complex and dispersed

systems requires an assessment of their external validity (to what extent are particular innovations of systemic relevance and worth propagating?) as much as their internal validity (Rodrik 2008). This creates methodological difficulties due to the inherent limits to knowability imposed by complexity. The CNHDRC's approach to evaluation and research in health sector reflects that it has a strong focus on the program theory as stressed by the realist evaluation (Pawson and Tilley 1997; Marchal et al. 2010; Marchal et al. 2012). The CNHDRC took seriously about the local reality and employed methods and tools to observe and interpret it.

Although the policy questions as well as methods applied in different case studies in the thesis varied from each other, mixed methods which combined qualitative methods and quantitative methods have been employed. In evaluating and researching in complex environment, mixed methods can be practical in overcoming issues of poor data availability and multiple layers of realities. The CNHDRC researchers often apply qualitative techniques such as participant observation, interview, focus group discussions to assess the process of implementation and how this affected program outcomes and impacts, in addition to quantitative methods such as questionnaire survey and cost-effective analysis. Besides support of the generalisation of statistical results, such mixed methods are good at including multi-dimensional perspective, and facilitating learning of key policy actors. More importantly, mixed methods have usually been employed in a consecutive order to achieve the most learning effect, corresponding to the complexity of policy question.

It is interesting to notice that the CNHDRC researchers are consciously aware of their role in developing policy-supporting tools and enhancing the policy learning capabilities, and actively structuring the learning of methodology through engaging multiple policy actors, studying local needs and situations, and combining old and new methods. Although there still remains the question of to what extent the thinktank can and will influence policy making, the current cases demonstrate an obvious impact on different stages of policy making—from research, to planning, decision making, and implementation.

Although it is still too early to claim the CNHDRC's approach can be replicated in other sectors or outside the country, these methodologic explorations are meaningful and serve as initial trial on developing meta-learning tools. The methodology taken by the CNHDRC served well the various decision purpose as shown in the case studies.

Many methods and tools can be used to support the meta learning, but need to be adapted to the complexity of the policy issue. Many methods and tools are available for supporting the meta learning of policy learning process. New methods, such as cost-effectiveness analysis, MCDA, and HTA can be introduced and adapted to the developing setting, but need to be handled in a subtle way that enables the learning of the method by the key policy actors. Mixed quantitative and qualitative methods should be employed to maximally meet the need of the research on the policy question. The use of qualitative methods, such as interview and focus group discussion, may help to better understand the local context and bring in multiple perspectives of local actors. The researcher and evaluator should be open-minded in engaging the end-user in developing the method and tool. Such collaborative and constructive approach may help to develop suitable research methodology that will provide the right knowledge for policy making. However, there is obvious limitation of viewing research and evaluation as the only driving force of the policy learning. There are political and other managerial factors that may greatly restrict the learning abilities, which are well beyond the reach of the current research. Moreover, when engagement with the end-user is too close, there is always a danger of the researcher trespassing on the turf of policy making. In future, there is a need to conduct more research on the main interfaces of the learning as well as the measure of learning outcomes and impact.

5.4.3 Implication to the other LMICs

Even though scientific evidence has been amassed globally (Jamison 2015; Black et al. 2016), how to support local decision-makers in making

context-relevant decisions on program planning and service delivery still remains a key area of research, especially for researchers based in LMICs (Peters et al 2009). The policymaking context in these countries is highly political and rapidly changing, and depends on a variety of factors, inputs, and relationships, and multiple pathways may be there to improving the system (Bloom & Ainsworth, 2010).

By making a comparison of 3 global south countries, China, India and South Africa, which are taking efforts in building HTA capacity and developing HTA systems, MacQuilkan and his colleagues (MacQuilkan, et al. 2018) argued that there are a lot of common problems and some shareable lessons for compiling a strategy of evidence-based decision-making and using tools such as HTA. “Learning and doing” strategy is stressed as an effective approach in improving health service delivery in developing countries, especially “developing and using systems for locally adaptive learning” (Peters et al 2009: 278). The LMICs decisionmaker needs to turn to local knowledge and learning process, to implement interventions that are proved to be cost-effective elsewhere. It indicates that we need to go beyond “what to do” and “how to do”, and go meta to why we are doing it in such a way. That is to enhance the meta-learning capability and address the difficult discussion about why some pilots failed and why should things be done in a new way.

Therefore, the key challenge for informing decision with evidence is about how to identify the particular evidence need and render context-specific evidence to the local decision-makers. The current discussion of the meta learning of policy learning process in China has certain implications for these countries with complex local situations.

Firstly, the policy-making process needs to formally recognise the role of adaptive learning and innovation in supporting better decision-making. In a world of increasing complexity, it is more and more challenging and less and less realistic for the decisionmakers, especially those in the LMICs to make good policy in one go. The Incremental policymaking based on local experiments and pilots should be considered

before jumping into nationwide policy implementation. The Chinese “learning by doing” approach has showed its vitality in promoting the 70 years’ rapid socio-economic development, and the 3E model of healthcare reform approach has driven complex health system reforms towards the UHC. Adaptive learning approach and learning capabilities supporting the learning are important for policymaking in rapid changing and complex context as one may find in most LMICs.

Secondly, with trust and support of the government, the thinktank and research institutions can play a functional role in sustaining such local adaptive learning. The learning of how to learn is a question about methodology of learning. Methodologic studies are concerned more about questions of “how to do” and “why to do”, than question of “what to do”. The CNHDRC’s approach reveals that attention to the end-user of evaluation or research (utilisation-focused), appreciation of complexity (complexity lens), and genuine interests in local reality (realist view) seem to be helpful in designing tools and methods for policy supporting meta-learning. Previous studies have already showed the importance of these theory-driven evaluation approach (Coryn et al. 2011; Marchal et al. 2014). The researchers and evaluators need to consciously examine their way of doing research and evaluation from time to time and engage with key policy stakeholders constantly to making the methods and tools more relevant to decisionmaking need. The trust and political backup of the government is very important for the CNHDRC to adopt and experiment the new method such as HTA or MCDA and adapt it in the local context. In future, more studies may be needed to measure the influence of evaluation and research in policy-making.

Table 5 - 1 Key messages delivered by each paper and chapter

Chapter	Case study	Key messages
2: The nature and main mode of learning in China	Value-based medicine procurement reform in China	<ul style="list-style-type: none"> - The policy-making process evolved and boldly embraced new concepts such as value in health - The Chinese government has taken an incremental approach to the complex health reforms like the 4+7 medicine procurement - Pre-defined program theory of the reform formulated and decisively implemented in a short period of time - Error-detecting and problem finding besides best practice identification are the key purposes of experiments and learning
	Evaluation and learning in complex, rapidly changing health systems: China's management of health sector reform	<ul style="list-style-type: none"> - The policy system in China is characterised by high levels of discretion on the part of implementing units (sub-national governments, local health bureaus, hospitals, and the like) which are on the front line of management of many health reforms. - A unique iterative "3 E" (experiment, experience, expand) approach to health reforms and policy making has been adopted in China - Sub-national experiment, innovation, learning happens in complex health policy implementation process in China - In the central-local learning space, a trusted probe like the national health think-tank (CNHDRC) is key for facilitating such a learning process - Evaluation approaches being used are evolving as Chinese research agencies become increasingly professionalised, and in response to the increasing complexity of reforms. - learning from widespread innovation and experimentation is challenging, but necessary for stewardship of large, and rapidly-changing systems - Some evidence may not be possible to detach from its local context, so more localised application of methods and tools as well as interpretation of research findings are key for facilitating the learning and innovations.

<p>3: How does the learning take place?</p>	<p>Essential drugs policy in three rural counties in China: What does a complexity lens add?</p>	<ul style="list-style-type: none"> - Policy implementation is regarded as a complex adaptive system, with multiple visible and invisible actors at multiple levels interacting with each other in various local contexts - Innovations and bad performance can both be possible, depending on the local leadership, interpretation of the policy, and initial responses - A real-time knowledge feedback mechanism through evaluation and learning is needed to support learning and avoid big risks and mistakes - For a well-designed and complex policy like the Essential Drug Policy, evaluation of the sub-national experiment on initial outcomes (single-loop learning) and program theory (double-loop learning) is important, but not adequate for enhancing the learning capabilities of the decision-makers and implementers - New methodological approach, such as developmental evaluation, could offer a unique complexity lens in capturing dynamic and rich learning points emerged from the locals
	<p>Conceptual indicators framework for strengthening the Chinese health system</p>	<ul style="list-style-type: none"> - The 12th Five Year Plan for Health was the first national health plan including evaluation as a mandate part - A utilization-focused evaluation approach was taken to engage target users in framing key questions for evaluations and key components of an indicators system, so as to make the process more utilization-focused. - The deliberative process convened and organized, with help of the evaluators, created a space for various actors to hold dialogue and make changes - The conceptual framework served as an initial platform for engaging end-users of the evaluation in exploring and improving the indicators system. - Evaluators create an active learning space for all the policy actors to gain capability of defining policy questions and proposing relevant indicators - Utilization-focused evaluation with a full attention to the end-user's need, is helpful in supporting the policy learning

	<p>Explicit priority setting of the national package of essential public health services</p>	<ul style="list-style-type: none"> - The CNHDRC researchers support the decision-makers in designing and implementing an explicit disinvestment decision-making process and exploring relevant methods and tools - A systematic approach to procedural design and evidence preparation is taken, and values and interests of multiple stakeholders are clearly represented and considered - A indigenous use of MCDA and HTA is experimented, with adaptation in the specific decision setting - Such a direct engagement in policy process requires for more skills and capabilities other than analytical ones (research methods and tools) - Failure of the case shows inadequacy of current learning of the policy learning process, and reminds the researchers of the potential danger of viewing the analytic skills as the core of the learning capabilities
<p>4: What tools can be used to support the process</p>	<p>Rapid HTAs in China</p>	<ul style="list-style-type: none"> - HTA system as part of the decision-supporting structure is being developed in China, signaling a shift to systematic evidence use in policy-making process - Rapid HTA is adapted and used for assessing medicine and medical device for very different decision purposes such as market withdrawal and capital funding decision - A consistent procedure, transparent pathway, and clear and straight-forward reporting format is developed by the researcher and accepted by the decision-maker
	<p>Maternal and child health research priority setting in Western</p>	<ul style="list-style-type: none"> - Priority setting method developed by the Child Health and Nutrition Initiative (CHNRI) is firstly introduced and adapted for defining research priority on maternal and child health in western region - The CNHDRC researchers conducts situational analysis before employing the method, and supports the key stakeholders' learning of the method - Top-down research design and bottom up analysis of local situations is combined to situate the method in the context where it aims to impact - Successful translation of the research findings shows the effect of such methodological innovation

China	
<p>Cost-effectiveness analysis of high impact child survival strategy in China</p>	<ul style="list-style-type: none"> - Cost effectiveness of high-impact maternal and child health interventions is analysed for informing maternal and child health planning during the 13th Five Year Plan period - The OHT-based cost-effectiveness analysis (CEA) is adopted and adapted by the CNHDRC researchers with wide consultation process and collection of various data and information - Findings are presented, and key recommendation absorbed in national child health strategy, and leads to a large-scale subnational experiment on these high impact interventions - The successful buy-in is attributed to the strong policy-orientation of the analysis, wide engagement of key stakeholders, and fine-tuned recommendation for policy making and recommendation
<p>Situational analysis of the Safe Newborn Project in 20 rural counties in China</p>	<ul style="list-style-type: none"> - As the continuation of the previous two cases, the case presents on how the CNHDRC researchers trial on methods for generating tailored evidence for policy implementation - Situational analysis is expanded to accommodate learning needs of various parties—policy makers, implementers, researchers at national and sub-national levels - Advanced evaluation theories, such as developmental evaluation and realist evaluation are trialed, and multiple tools including field survey, cost-effectiveness analysis, bottleneck analysis are combined to deliver the anticipated evidence - The evidence for the implementation process is a product of the learning process, and results from cooperation between policy-makers, local implementers, and researchers - A reciprocal learning mechanism with multiple feed-back loops is created by the researchers through the project, which will support continuous learning between policy-makers, implementers, and other key actors involved in the project

Table 5 - 2 The different roles the thinktank can play

Chapter	Case study	The think tank's role
2: The nature and main mode of learning in China	Value-based medicine procurement reform in China	<p>Observer: observed the reform process and documented initial actions and their results;</p> <p>Potential evaluator: comprehensive evidence review and appraisal is called, and CNHDRC as the national agency for health technology assessment, can help to evaluate and assessment the reform;</p>
	Evaluation and learning in complex, rapidly changing health systems: China's management of health sector reform	<p>Evaluator: CNHDRC acted as independent evaluation institutions in the two cases, and supported the national government in understanding the progress, effectiveness, and even cost-effectiveness of the pilot programmes such medical rehabilitative care and merger of MCH and family planning facilities;</p> <p>Learner: CNHDRC researchers learned about ways of approach evaluation of such complex programmes in complex situations such as rural counties in different parts of the country;</p> <p>Facilitator of learning: CNHDRC supported the exchange of information between multiple stakeholders at different levels (national, provincial, county level), and facilitated the programme designer's understanding of the theory behind the pilot programme.</p>
3: How does the learning take place?	Essential drugs policy in three rural counties in China: What does a complexity lens add?	<p>Evaluator: CNHDRC was commissioned to conduct the initial implementation of the essential drug policy;</p> <p>Learner: CNHDRC researchers knew the limit of the policy design itself after initial investigation of local situations, and they learned and tried the developmental evaluation approach and added a lens of complexity;</p> <p>Facilitator of learning: Lens of complexity did support the learning of the local pilot implementation, and feedback loops created by the evaluation may make further impact on the research community and relevant policy-makers.</p>
	Conceptual indicators framework for	<p>Evaluator: CNHDRC was commissioned to develop the indicator system for the 12th Five Year Health Plan;</p> <p>Learner: CNHDRC researchers learned about the utilisation-focused evaluation approach, and decided to</p>

	strengthening the Chinese health system	experiment on the indicators of the health plan by engaging key end-users of the indicators; Facilitator of learning: Both researchers and decision-makers at central and local level learned about each other's concerns better through discussion and mapping of the key decision questions.
	Explicit priority setting of the national package of essential public health services	Evaluator: CNHDRC was given the task of developing approach and relevant tools of public health priority-setting; Learner: CNHDRC researchers learned methods such as multiple criteria decision analysis (MCDA) Facilitator of learning: through meetings and participation in priority-setting activities, the key stakeholders (decisionmaker, policy researcher, health manager and professionals) had come to know the meaning and technical tools for priority setting.
4: What tools can be used to support the process	Rapid HTAs in China	Evaluator: CNHDRC was commissioned to conduct HTA of various kinds of technologies; Learner: rapid HTA as a method is new to the Chinese researcher, and they need to learn and adapt it in the local decision-making context; Facilitator of learning: for HTA community in China, rapid HTA is a new method, and how to apply and adapt to the Chinese decision-making process is a common topic for learning.
	Maternal and child health research priority setting in Western China	Researcher: CNHDRC conducted the research commissioned by UNICEF; Learner: CNHDRC researchers learned the CHNRI method and adapted it in the priority-setting practice in the field of maternal and child health (MCH); they learned the local MCH service delivery system through field studies, which supported better adaptation and use of the CHNRI method in prioritising the key research questions. Facilitator of learning: MCH decisionmaker, researchers, and other key stakeholders learned more about the research priority setting through participating in the study.
	Cost-effectiveness	Researcher: CNHDRC conducted the study commissioned by UNICEF and the National Health

	analysis of high impact child survival strategy in China	<p>Commission, to inform the development of the China Child (0-6) Survival Strategy;</p> <p><u>Learner:</u> CNHDRC researchers learned to use One-health Tool in conducting cost-effectiveness analysis, and adapted to the local context by selecting appropriate interventions, defining the care pathway, collecting parameters and data, and making context-specific recommendations;</p> <p><u>Facilitator of learning:</u> MCH researchers, clinicians, decisionmakers learned about the new tool—One-health Tool and appreciate its use by being engaged in the research process.</p>
	Situational analysis of the Safe Newborn Project in 20 rural counties in China	<p><u>Evaluator:</u> CNHDRC was commissioned to design the monitoring and evaluation, and conduct baseline study. It planned and implemented the situational analysis in 20 counties to prepare evidence for supporting the local in planning pilot implementation;</p> <p><u>Learner:</u> CNHDRC researchers learned the local needs and designed the complicated situational analysis to cover the needs; they changed the design and combined the new tools such as the ENAP bottleneck analysis tool with the old ones like questionnaires, focus group discussion and key informant interviews;</p> <p><u>Facilitator of learning:</u> decisionmakers, implementers, health professionals, researchers at central, provincial and local level interacted through meetings, data collection, interviews and field tours, as well as ongoing discussions of the project. Importance of evidence in decision making was recognised and accepted by the key stakeholders in pilot counties and provinces. The new approach to situational analysis and its role in supporting better implementation planning has been received well among national and local researchers, as well as the decisionmaker and implementer. Pilot provinces selected their sites based on the situational analysis, and pilot sites compiled their implementation plans based on the evidence and knowledge provided by the researchers.</p>

References

1. Alva, S., E. Kleinau, A. Pomeroy, & K. Rowan. 2009. *Measuring the impact of health system strengthening: A review of the literature*. Washington, DC: U.S. Agency for International Development.
2. Anderson, R., B. F. Crabtree, D. J. Steele, et al. 2005. Case Study Research: The View from Complexity Science. *Qualitative Health Research*, 15: 669 – 685.
3. Anderson, R. A. & R. R. McDaniel. 2000. Managing health care organizations: Where professionalism meets complexity science. *Qualitative Health Research*, 15(5): 669 - 685.
4. Ang, Y. 2016. *How China escaped the poverty trap*. Ithaca: Cornell University Press.
5. Atun, R. & N. Menabde. 2008. Health systems and systems thinking. in R. Coker et al. (eds.) *Health Systems and the Challenge of Communicable Diseases: Experiences from Europe and Latin America*. Berkshire: Open University Press.
6. Archer, M. S. 1995. *Realist Social Theory: The Morphogenetic Approach*. Cambridge University Press, Cambridge.
7. Argote, L. 2011. Organizational Learning Research: Past, Present and Future. *Management Learning*, 42 (4): 439–46.
8. Argyris, C. 1976. Single-loop and double-loop models in research on decision-making. *Administrative Science Quarterly*, 21: 363-377.
9. Argyris, C. 1982. *Organizational Dynamics*. AWCOP Periodicals Division. American Management Associations.
10. Argyris, C. 1995. Action science and organizational learning. *Journal of Managerial Psychology*, 10(6): 20-26.
11. Argyris, C. 2003. A life full of learning. *Organization Studies*, 24(7): 1178-1192.
12. Argyris, C. and D.A. Schön. 1974. *Theory in Practice: Increasing professional effectiveness*. Jossey Bass, San Francisco.
13. Argyris, C. and D. A. Schön. 1978. *Organizational Learning: A theory of action perspective*. Reading, MA: Addison Wesley.
14. Argyris, C. and D.A. Schön. 1996. *Organizational Learning II: Theory, Method and Practice*, Addison-Wesley, Reading, MA.
15. Ball, H., L. Kemp, R. Fordham. 2009. Road testing programme budgeting and marginal analysis: Norfolk Mental Health pilot project. *The Psychiatrist*, 33(4):141–4. <http://pb.rcpsych.org/content/33/4/141.full.pdf+html>. Accessed on April 19, 2019.
16. Bali, A S, G Capano and M. Ramesh. 2019. Anticipating and designing for policy effectiveness. *Policy and Society*, 10.1080/14494035.2019.1579502, (1-13).
17. Baltussen, R, E. Stolk, D. Chisholm, et al. 2006. Towards a composite league table for priority setting: An application to Ghana. *Health Economics*, DOI: 10.1002/hec.1092.
18. Baltussen, R, G. Asbroek, N. Shrestha, et al. 2005. A rational approach to priority setting: should a lung health program be implemented in Nepal? *iMTA Discussion paper 6*.
19. Baltussen, R., M. P. Jansen, T. S. Mikkelsen, et al. 2016. Priority Setting for Universal Health Coverage: We Need Evidence-Informed Deliberative Processes, Not Just More Evidence on Cost-Effectiveness. *International Journal of Health Policy and Management*, 5(11), 615-618.
20. Bamberger, M, J. Vaessen, E. Raimondo. (eds.). 2015. *Dealing with complexity in development evaluation: A practical approach*. Sage Publications.
21. Bamberger, M., V. Rao, M. Woolcock. 2010. Using mixed methods in monitoring and evaluation: experiences from international development (English). *Policy Research working paper; no. WPS 5245*. Washington, DC: World Bank.

22. Barnes, M., E. Matka, H. Sullivan. 2003. Evidence, understanding and complexity: Evaluation in non-linear systems. *Evaluation*, 9(3): 265-284.
23. Bartlett, L, E. Weissman, R. Gubin, et al. 2014. The impact and cost of scaling up midwifery and obstetrics in 58 low- and middle-income countries. *PLoS One*, 9(6): e98550.
24. Barzelay, M. 2007. Learning from Second-Hand Experience: Methodology for Extrapolation Oriented Case Research. *Governance*, 20 (3), 521–543.
25. Bason, C. 2014. *Design for Policy (New ed.)*. Farnham, Surrey; Burlington, VT: Gower Pub Co.
26. Bateson, G. 1972. *Steps to an ecology of mind*. San Francisco: Chandler.
27. Bazeley, P. 2007. *Qualitative data analysis with Nvivo*. London: Sage.
28. Bennett, C. J. and M. Howlett. 1992. The Lessons of Learning: Reconciling Theories of Policy Learning and Policy Change. *Policy Sciences*, 25: 275–94.
29. Beverly, S., N. Glasgow, and D. Longstaff. 2004. *Complex adaptive systems: A different way of thinking of health care systems*. available at: www.anu.edu.au/aphcri. Accessed on Nov. 18, 2011.
30. Bhaskar, R. 1978. *A Realist Theory of Science*, Harvester, Hassocks.
31. Bloom, G., H. Standing, H. Lucas, et al. 2011. Making Health Markets Work Better for Poor People: The Case of Informal Providers. *Health Policy and Planning*, 26: i45-i52. doi:10.1093/heapol/czr025.
32. Bloom, G. and S. Wolcott. 2013. Building Institutions for Health and Health Systems in Contexts of Rapid Change. *Social Science and Medicine*, 96: 216-222.
33. Bloom, G., V. Lin, Q. Wu. 2010. Policy Implementation. In Vivian Lin et al (eds.) *Health Policy in and for China*. Beijing: Peking University Medical Press: 545 - 555.
34. Berry, F. S., and W. Berry. 2007. Innovation and Diffusion Models in Policy Research in Theories of the Policy Process. In *Theories of the Policy Process*, ed. Paul A. Sabatier. Boulder, CO: Westview Press, 169–200.
35. Black R, C. Levin, N. Walker, D. Chou, L Liu, et al. 2016. Reproductive, Maternal, Newborn, and Child Health: Key Messages from Disease Control Priorities, 3rd Edition. *The Lancet*. 388(10061):2811-24.
36. Bloom, G. and P. Ainsworth. 2010. Beyond Scaling Up: Pathways to Universal Access to Health Services. *STEPS Working Paper 40*. Brighton: STEPS Centre.
37. Brownson, P., J. G. Gurney and G. H. Land. 1999. Evidence-based decision making in public health. *J Public Health Management Practice*, 5(5), 86-97.
38. Byrne, A, A. Hodge, E. Jimenez-Soto. 2015. Accelerating Maternal and Child Health Gains in Papua New Guinea: Modelled Predictions from Closing the Equity Gap Using LiST. *Maternal Child Health J*, 19(11):2429-2437.
39. Byrne, D. 2013. Evaluating complex social interventions in a complex world. *Evaluation*, 19(3).
40. Byrt, T. 1996. How good is that agreement? *Epidemiology*, 7: 561.
41. Cameron, A., A. Watt, T. Lathlean, et al. 2007. Rapid versus full systematic reviews: an inventory of current methods and practice in health technology assessment. *ASERNIP-S report number 60*. Adelaide: Australian Safety and Efficacy Register of New Interventional Procedures-Surgical (ASERNIP-S).
42. Carrillo B. and J. Duckett. 2011. *China's Changing Welfare Mix: Local Perspectives*. Routledge.
43. CCTV. 2009. Interview of Health Minister Chen Zhu on the understandings of the national essential drugs policy. *CCTV Topics in Focus*. August 21, 2009. Available at <http://tv.people.com.cn/GB/14645/9908757.html>. Accessed on January 11, 2011.
44. Centers for Disease Control and Prevention. 2016. *A framework for Program Evaluation*. <https://www.cdc.gov/eval/framework/>. Accessed on Feb. 24, 2016.
45. Chapman, J. 2004. *System failure: why governments must learn to think differently (second edition)*. London: Demos.
46. Chen, M. H., Q. Y. Wu. 2004. Factors influencing maternal and child care provision. *Modern Preventive Medicine*, 31 (6): 810-812.
47. Cheng, H. and J. Kang. 2015. Evolutionary trajectory of the reforms of administrative approval system in China: 2001-2014. *Reform*, 6: 34-42.

48. Chola, L., S. McGee, A. Tugendhaft, et al. 2015. Scaling Up Family Planning to Reduce Maternal and Child Mortality: The Potential Costs and Benefits of Modern Contraceptive Use in South Africa. *PLoS One*, 10(6): e0130077.
49. Chung, J. H. 2000. *Central control and local discretion in China*. Oxford; New York, Oxford University Press.
50. Cicchetti, D.V. & A.R. Feinstein. 1990. High agreement but low Kappa: II. Resolving the paradoxes. *J Clin Epidemiol*, 43: 551–558.
51. Commentary on health reforms: Innovations called for deepening the health reforms. *China Reform Newspaper*. May 8, 2012. http://www.china.com.cn/fangtan/zgsyg/2012-05/08/content_25332539.htm. Accessed at China Talk on September 14, 2017.
52. Coryn, C, L. Noakes, C. Westine, et al. 2011. A systematic review of theory-driven evaluation practice from 1990 to 2009. *American Journal of Evaluation*, 32: 199-226.
53. CNHDRC. 2013. *Mid-term Evaluation of the Implementation of the 12th Five Year Plan for Health*. Beijing: CNHDRC.
54. CNHDRC. 2015. *China child health account research report*. Beijing: CNHDRC.
55. CNHDRC. 2018. *Abstract of China National Health Accounts*. Beijing: CNHDRC.
56. Craig, P., P. Dieppe, S. Macintyre, S. Michie, I. Nazareth & M. Petticrew. 2008. *Developing and evaluating complex interventions: new guidance*. Medical Research Council, UK.
57. Culyer, A.J. & J. Lomas. 2006. Deliberative processes and evidence-informed decision-making in health care: do they work and how might we know? *Evidence and Policy*, 2 (3). pp. 357-371. ISSN 1744-2648.
58. Cui, W. 2011. Factors impacting on MCH delivery. *China Health Sector*, Vol.8: 122.
59. Dangjian Wangwei. 2016. *Xi Jinping's comments on how to overcome the capability panic*. March 28th, 2016, http://www.wenming.cn/djw/gcsy/djxx/201604/t20160407_3268818.shtml. Accessed on April 12th, 2020.
60. Dellinger, A.B. & N.L. Leech. 2007. Toward a unified validation framework in mixed methods research. *Journal of Mixed Methods Research*, 1: 309–32.
61. Deming, W.E. 1950. *Elementary Principles of the Statistical Control of Quality*. JUSE.
62. Deming, W.E. 1990. *Personal letter to Ron Moen*. on November 17, 1990.
63. Ding, Y, H.J. Smith, Y. Fei, et al. 2013. Factors influencing the provision of public health services by village doctors in Hubei and Jiangxi provinces China. *Bull World Health Org Suppl*, 91(1):64–9.
64. Donabedian, A. 1980. *The definition of quality and approaches to its assessment*. Vol. 1: Explorations in quality assessment and monitoring. Ann Arbor, MI: Health Administration Press.
65. Du, K.L. 1994a. Study of the development strategy of maternal and child health system in poor and remote rural dwelled by ethnic minority. *Soft Science of Health*, 5: 39-41.
66. Du, K.L. 1994b. Recommendations on establishing MCH service system compatible with social and economic development in the country in revolutionary base, remote and poverty-stricken areas dwelled by minorities. *China Maternal and Child Health*, 4: 7-9.
67. Duckett, J. 2003. Bureaucratic interests and institutions in the making of China's social policy. *Public Administration Quarterly*, 27: 210 – 237.
68. Dunlop, C. A., & C. M. Radaelli 2013. Systematising policy learning: from monolith to dimensions. *Political Studies*, 61(3).
69. Dunlop, C.A. & C. Radaelli. 2016. Policy Learning in the Eurozone Crisis: Modes, Power and Functionality. *Policy Sciences*, 49(2): 107-24.
70. Edgar, K., P. Garrette, V. Lin. 2001. *Health Planning: Australian Perspectives*. Sydney: Allen & Unwin.
71. Elshaug, A.G., J.R. Moss, P. Littlejohns, et al. 2009. Identifying existing health care services that do not provide value for money. *Med J Aust*, 190(5): 269–73.
72. Eddy, D.M. 1991. Clinical Decision-making: From Theory to Practice. The Individual vs Society. Is There a Conflict? *JAMA*, 265:1446, 1449-1450.

73. Evans, M. 2009. Policy Transfer in Critical Perspective. *Policy Studies*, 30 (3): 243–68.
74. Featherstone RM, DM Dryden, M Foisy et al. 2015. Advancing knowledge of rapid reviews: an analysis of results, conclusions and recommendations from published review articles examining rapid reviews. *Systematic Review*, 4:50.
75. Feng, X., E. Theodoratou E, L. Liu, et al. 2012. Social, economic, political and health system and program determinants of child mortality reduction in China between 1990 and 2006: A systematic analysis. *J Glob Health*, 2(1): 010405.
76. Feng, Z., H. Jia, & L. Zhang, et al. 2010. *Factors and modelling of impact of MCH interventions. Health VIII Project Report*. Beijing: DFID Beijing Office.
77. Fewsmith, J. 2006. Institutional innovation at the grassroots level: Two case studies. *China Leadership Monitor*, 18.
78. Fleck, LM. 2001. Healthcare justice and rational democratic deliberation. *American Journal of Bioethics*, 1(2), 20-21.
79. Fiol C. M. and M. A. Lyles. 1985. Organizational learning. *Academy of Management Review*, vol. 10, no. 4: 803–813.
80. Fischer, F. 2003. *Reframing Public Policy: Discursive Politics and Deliberative Practices*. Oxford: Oxford University Press.
81. Foster, K. 2005. Chinese public policy innovation and the diffusion of innovations: An initial exploration. *Chinese Public Administration Review*, 3(1/2): 1-13.
82. Freeman, R. 2006. Learning in Public Policy. In Michael Moran, Martin Rein, and Robert E. Goodin (eds.), *The Oxford Handbook of Public Policy*. Oxford: Oxford University, 367–88.
83. Friedman C, J Rubin, J Brown, et al. 2015. Toward a science of learning systems: a research agenda for the high-functioning Learning Health System. *J Am Med Inform Assoc*, 22:43–50.
84. Fukuyama, F. 2004. *State Building: Governance and World Order in the 21st Century*. London: Profile Books.
85. Gatrell, A. C. 2005. Complexity theory and geographies of health: A critical assessment. *Social Science & Medicine*, 60(12): 2661–2671.
86. Gerlak, A. K., & T. Heikkila. 2011. Building a Theory of Learning in Collaboratives: Evidence from the Everglades Restoration Program. *Journal of Public Administration Research and Theory*, 21 (4): 619–44.
87. Gerlak, A. K., and T. Heikkila. 2013. Building a Conceptual Approach to Collective Learning: Lessons for Public Policy Scholars. *The Policy Studies Journal*, Vol. 41, No. 3, 2013.
88. Gerring, J. 2007. *Case Study Research: Principles and Practices*. Cambridge: Cambridge University Press.
89. Giorgi, A. 1995. *Phenomenology and psychological research*. Pittsburgh: Duquesne University Press.
90. Göbel, C. 2011. Uneven policy implementation in rural China. *The China Journal*, 65: 53-76.
91. Goodman, C. 2012. *Rapid Reviews*. Presentation at the 2012 HTAi Annual Meeting. Bilbao, Spain. 2012-6-24.
92. Grief, A. and D. D. Laitin. 2004. A Theory of Endogenous Institutional Change. *American Political Science Review*, 98 (4): 633–52.
93. Gu, S. 2013. Institutional entrepreneurship and policy learning in China. *Journal of Science and Technology Policy in China*, 4(1): 36-54.
94. Greenhalgh, T. & J. Russell. 2009. Evidence-based policy making: a critique. *Perspectives in Biology and Medicine*, volume 52, number 2: 304–18.
95. GAVI. 2013. *Price reduced for vaccine against pneumococcal disease*. <http://www.gavi.org/library/news/statements/2013/price-reduced-for-vaccine-against-pneumococcal-disease/>.
96. Haggis, T. 2008. Knowledge must be contextual': exploring some possible implications of complexity and dynamic systems theories for educational research. *Educational Philosophy and Theory*, 40(1): 159–176.
97. Haggis, T. 2010. Approaching complexity: A commentary on Keshavarz, Nutbeam,

- Rowling and Khavarpour. *Social Science & Medicine*, 70: 1475-1477.
98. Hailey, D. 2009. A preliminary survey on the influence of rapid health technology assessments. *Int. J Technol Assess Health Care*, 25:3, 415–418.
 99. Hailey, D., P. Corabian, C. Hartsall, et al. 2000. The use and impact of rapid health technology assessment. *Int. J Technol Assess Health Care*, 16: 651-6.
 100. Ham, C. 1997. Priority setting in health care: learning from international experience. *Health Policy*, 42, 49– 66.
 101. Han, Z. 2014. “Cross the river by feeling the stone”: the origin and future development. *Study Times*, April 21, 2014. <http://theory.people.com.cn/n/2014/0421/c40531-24920132.html>. Accessed on April 10, 2020.
 102. Harding, A, & M. Woolcock. 2012. *But how generalizable is that? A primer for development practitioners on assessing the external validity of ‘complex’ interventions*. World Bank. URL: <http://um.dk/en/~media/UM/Danish-site/Documents/Danida/Resultater/Eval/Ref%20doc/Woolcock.ashx>.
 103. Haas, P.M. 1992. Introduction: Epistemic Communities and International Policy Coordination. *International Organization*, 46 (1), 1-36.
 104. Healthy China 2020 Compilation Committee. 2012. *Report on Healthy China 2020 Strategy Research*. Beijing: People’s Medical Publishing House.
 105. Heilmann, S. 2008. From local experiments to national policy: The origins of China’s distinctive policy process. *The China Journal*, 59: 1-30.
 106. Heilmann, S. 2009. Maximum tinkering under uncertainty: Unorthodox lessons from China. *Modern China*, 35(4): 450-462.
 107. Heilmann, S. 2015. Policy experimentation in China’s economic rise. *Studies in Comparative International Development*, 43(1): 1-26.
 108. Hill, M. and P. Hupe 2009. *Implementing public policy*. London: Sage.
 109. Holland, J. H. 1992. *Adaptation in natural and artificial systems: an introductory analysis with applications to biology, control, and artificial intelligence*. Cambridge, Mass: MIT Press.
 110. Howlett, M., & I. Mukherjee. 2014. Policy design and non-design: Towards a spectrum of policy formulation types. *Politics and Governance*, 2(2), 57–71.
 111. Howlett, M., I. Mukherjee, J.J. Woo. 2015. From tools to toolkits in policy design studies: The new design orientation and policy formulation research. *Policy and Politics*, 43(2): 291–311.
 112. Husain, L. 2013a. Implementing and Innovating: Local Governments in the Development of China’s New Cooperative Medical Scheme. *PhD thesis*. Leeds: University of Leeds, Department of East Asian Studies and White Rose East Asia Centre.
 113. Husain, L. 2013b. National Policy, Sub-National Trajectories – Development of Local Models in China’s Health Reform Process, in C. M. Dent and C. Brautaset (eds.), *The Great Diversity: Trajectories of Asian Development*. Wageningen: Wageningen Academic Publishers.
 114. Husain, L. 2015. Logics of government innovation and reform management in China. *STEPS Centre Working Paper, No. 85*, Brighton: STEPS Centre. Available from: <http://steps-centre.org/publication/logics-of-government-innovation-and-reform-management-in-china/?referralDomain=working-paper>.
 115. Husain, L. 2017. Policy experimentation and innovation and China’s management of complex health reforms. *Globalisation and Health*, 13(54).
 116. Huang, Z. 2009. Investigations on current status of human resources in township health centers in remote areas dwelled by minorities. *Maternal and Child Health Care of China*, 24: 3920-3922.
 117. IJzerman, M., N. Devlin, P. Thokala, et al. on behalf of the ISPOR MCDA Task Force 2014. *Multi-criteria decision analysis for healthcare decision making*, presented at the ISPOR 17th Annual European Congress Amsterdam, The Netherlands 8-12 Nov. 2014.

118. Institute F. *OneHealth Manual*, 2012.
119. Jamison D. 2015. Disease Control Priorities, 3rd edition: improving health and reducing poverty. *The Lancet*. Published online 5 February 2015.
120. Ji, Z. Ten experiences of successful reforms and continuous development of the P. R. China. *People's Daily*. <http://politics.people.com.cn/n1/2017/1124/c1001-29666765.html>. Nov. 24, 2017.
121. Johns B., K. Sigurbjornsdottir, H. Fogstad, et al. 2007. Estimated global resources needed to attain universal coverage of maternal and newborn health services. *Bull World Health Organ*, 85 (4): 256-263.
122. Kafiriri, L. & D. K. Martin 2007. A strategy to improve priority setting in developing countries. *Health Care Analysis*, 15, 159– 167.
123. Kafiriri, L., L. Tomlinson, M. Gibson, et al. 2007. Setting priorities in global child health research investments: addressing values of stakeholders. *Croatian Medical Journal*, 48(5), 618-627.
124. Karen, E., Li, L., Meng, Q., et al. 2008. Health service delivery in china: a literature review. *Health Economics*.
125. Khangura, S., K. Konnyu, R. Cushman, et al. 2012. Evidence summaries: the evolution of a rapid review approach. *Systematic Reviews*, 1:10.
126. Klein, R. 1993. Dimensions of rationing: who should do what? *BMJ*, 307:309.
127. Klein, R., & A. Williams. 2000. Setting priorities: what is holding us back—inadequate information or inadequate institutions? In A. Coulter, & C. Ham (eds.), *The global challenge of health care rationing*. Buckingham: Open University Press.
128. Lauer, J.A., D. Rajan and M.Y. Bertram. 2017. Priority Setting for Universal Health Coverage: We Need to Focus both on Substance and on Process. Comment on “Priority Setting for Universal Health Coverage: We Need Evidence-Informed Deliberative Processes, not Just More Evidence on Cost-Effectiveness”. *International Journal of Health Policy and Management*, 6, 601-603.
129. Lessard, C. 2007. Complexity and reflexivity: Two important issues for economic evaluation in health care. *Social Science & Medicine*, 64: 1754 - 1765.
130. Li, Z. 2009. China reforms enter “deep-water zone”. *www.ifeng.com*. 2009-6-15, <http://finance.ifeng.com/roll/20090615/790822.shtml>. Accessed on the May 19, 2020.
131. Li, T, L. Trudy, X. Zheng, et al. 2016. Determinants of basic public health services provision by village doctors in China: using non-communicable diseases management as an example. *BMC Health Services Research*, 16:42 DOI 10.1186/s12913-016-1276-y.
132. Li, Z, & M. Zhu. 2013. *New Thinking of China Reforms: Build a Human-centered Economy*. Beijing: Publishing House of Electronics Industry.
133. Lieberthal, K & M. Oksenberg. 1988. *Policy Making in China: Leaders, Structures, and Processes*. Princeton, New Jersey: Princeton University Press.
134. Ling, X. 2016. Gaming of the central and local logic: Dilemma and opportunity brought by the dual system of administrative approval reforms. *Socialism Studies*, 6(230): 78-88.
135. Liu, Y & G. Bloom. 2010. Rural health system reform in poverty areas. In Vivian Lin et al. (eds.), *Health Policy in and for China*. Beijing: Peking University Medical Press: 661 - 669.
136. Liu, C. 2018. Opinion: “Cross the river by feeling the stone”: a valuable lesson after 40 years. *CGTN*, Dec. 18, 2018.
137. Lenoble, J. & O. De Schutter. (eds.). 2010. *Reflexive Governance: Redefining the Public Interest in a Pluralistic World*. Oxford: Hart.
138. Luo, J. 2011. *On Deng Xiaoping's Incremental Reform Policy*. Available at: <http://www.lbnews.com.cn/subject/jd/article.php?id=68925>. Accessed on June 27, 2011.
139. Luo, R. 2010. Need analysis of maternal and child health research in China. *Maternal and Child Health Care of China*, 1(1): 48-50.
140. MacQuilkan, K., P. Baker, L. Downey, et al. Strengthening health technology assessment systems in the global south: a comparative analysis of the HTA journeys

- of China, India and South Africa. *Glob Health Action*. 2018; 11(1): 1527556.
141. Manion, M. 1991. Policy implementation in the People's Republic of China: Authoritative decisions versus individual interests. *The Journal of Asian Studies*, 50(2): 253-279.
 142. Marchal, B. S. V. Belle, V. D. Brouwere et al. 2014. Complexity in Health: Consequences for research & evaluation. *FEM Health discussion paper*. www.abdn.ac.uk/femhealth.
 143. Marsh, K., M. Goetghebeur, P. Thokala et al. 2017. *Multi-criteria decision analysis to support healthcare decisions*. 10.1007/978-3-319-47540-0.
 144. Matland R. E. 1995. Synthesising the implementation literature: the ambiguity-conflict model of policy implementation. *Journal of public administration and research*, 5(2): 145-174.
 145. McDaniel, R., & D. Driebe. 2001. Complexity Science and Health Care Management. In J. Blair, M. Fottler, and G. Savage (eds.), *Advances in Health Care Management*. Stamford, Connecticut: JAI Press, Volume 2: 11 - 36.
 146. McPake B, Edoka I, Witter S, et al. 2015. Cost-effectiveness of community-based practitioner programmes in Ethiopia, Indonesia and Kenya. *Bull World Health Organ*, 93(9): 631-639A.
 147. Meessen, B. and G. Bloom. 2007. Economic transition, institutional changes and the health system: Some lessons from rural China. *Journal of Economic Policy Reform*, 10(3): 209-231.
 148. McCann, E. 2011. Points of reference: Knowledge of elsewhere in the politics of urban drug policy. In McCann, EJ and Ward, K (eds.), *Assembling Urbanism: Mobilizing Knowledge & Shaping Cities in a Global Context*. Minneapolis: University of Minnesota Press.
 149. McCormick, B. L. 1987. Leninist implementation: The election campaign. *Policy implementation in post-Mao China*. D. M. Lampton, Ed. Berkeley; London, University of California Press.
 150. McDaniel, R., & D. Driebe. 2001. Complexity Science and Health Care Management. In J. Blair, M. Fottler, and G. Savage (eds.), *Advances in Health Care Management*. Stamford, Connecticut: JAI Press, Volume 2: 11 - 36.
 151. Medical Services Advisory Committee (MSAC). 2011. Welcome to the Medical Services Advisory Committee. Canberra ACT: Commonwealth of Australia. Review of kyphoplasty for the treatment of vertebral compression fracture and review of interim funded service: Vertebroplasty for the treatment of vertebral compression fracture; 2011. <http://www.msac.gov.au/internet/msac/publishing.nsf/Content/27.1-1>. Accessed on May 14, 2019.
 152. Meessen, B. and G. Bloom. 2007. Economic transition, institutional changes and the health system: Some lessons from rural China. *Journal of Economic Policy Reform*, 10(3): 209-231.
 153. Mendoza, A. & M Woolcock. 2014. Integrating qualitative methods into investment climate impact evaluations (English). *Policy Research working paper, no. WPS 7145; Impact Evaluation series*. Washington, DC: World Bank Group.
 154. Meng Q, Mills A, Wang L, et al. 2019. What can we learn from China's health reforms? *BMJ*, 365: l2349. doi:10.1136/bmj.l2349.
 155. Michalow, J, L. Chola, S. McGee, et al. 2015. Triple return on investment: the cost and impact of 13 interventions that could prevent stillbirths and save the lives of mothers and babies in South Africa. *BMC Pregnancy and Childbirth*, 15: 1.
 156. Minichiello, V., G. Sullivan, K. Greenwood, & R. Axford. 2004. *Handbook for research methods in the social sciences*. Sydney: Longman.
 157. Ministry of Health. 2009. Statistical Communiqué on Health. http://www.360doc.com/content/16/0926/00/32873102_593638110.shtml.
 158. Ministry of Health. 2011. Report on Women and Children's Health Development in China. Beijing: Ministry of Health.
 159. Ministry of Health. 2012. *Notice on Evaluating the Pilots on Integrated Rehabilitative Care in China*. April 27, 2012. <http://www.nhfpc.gov.cn/mohyzs/s7652/201109/52825.shtml>. Accessed on August 12,

- 2017.
160. MoH and other eight ministries. 2009. *Guidance on Establishing a National Essential drugs system and Its Implementation*. Website of the Chinese Central Government. August 18, 2009, Beijing. Available at http://www.gov.cn/gzdt/2009-08/18/content_1395423.htm. Accessed on Jan. 21, 2011.
 161. Moher, D., L. Shamseer, M. Clarke, et al. 2015. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement, *Systematic Reviews*. 4:1.
 162. Moore, A., H. McQuay. 2006. *Bandolier's Little Book of Making Sense of the Medical Evidence*. Oxford University press, Oxford England.
 163. Mosley, W. and L. Chen. 1984. An analytical framework for the study of child survival in development countries. *Population and Development Review*, 10: 25-45.
 164. Moynihan, D.P. 2005. Why and How Do State Governments Adopt and Implement "Managing for Results" Reforms? *Journal of Public Administration Research and Theory*, 15 (2), 219-243.
 165. Mukherjee, I & A. S. Bali. 2019. Policy effectiveness and capacity: two sides of the design coin. *Policy Design and Practice*, 2:2, 103-114.
 166. Mulgan, G., & Albury, D. 2003. *Innovation in the public sector*. London: Innovation in the Public Sector, Strategy Unit, Cabinet Office.
 167. Murray, C., & J. Frenk. 2000. A framework for assessing the performance of health systems. *Bulletin of the World Health Organization*, 78(6), 717–731.
 168. Mutale, W, V. Bond, M. T. Mwanamwenge, et al. 2013. Systems thinking in practice: the current status of the six WHO building blocks for health system strengthening in three BHOMA intervention districts of Zambia: a baseline qualitative study. *BMC Health Serv Res*, 13: 291.
 169. Nair, S. and M. Howlett. 2016. From robustness to resilience: avoiding policy traps in the long term. *Sustainability Science*, 10.1007/s11625-016-0387-z, 11, 6, (909-917).
 170. National Health Commission. 2016. *Outline of the Healthy China 2030 Plan*. Beijing: National Health Commission.
 171. National Health Commission. 2019. Statistical Communiqué on Health. <http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml>
 172. New, K. 2014. *Every Newborn: An Action Plan to end Preventable Deaths*. Neonatal Nurses College of Aotearoa-New Zealand Nurses Organisation.
 173. NHFPC. 2016. *China Child (0-6) Survival Strategy: From Evidence to Action*. Beijing: NHFPC.
 174. O'Brien, K. J. 2010. How authoritarian rule works. *Modern China*, 36(1): 79-86.
 175. Ostrom, E. 2007. Institutional Rational Choice: An Assessment of the Institutional Analysis and Development Framework. In Paul A. Sabatier (eds.), *Theories of the Policy Process*. Boulder, CO: Westview Press, 21–64.
 176. Paina, L. & D. Peters. 2011. Understanding pathways to scaling up health services in complex adaptive systems. *Health Policy and Planning*, 27(5): 365-373.
 177. Parsons, W. 2004. Not Just Steering but Weaving: Relevant Knowledge and the Craft of Building Policy Capacity and Coherence. *Australian Journal of Public Administration*, 63 (1): 43–57. doi:10.1111/j.1467-8500.2004.00358.x.
 178. Patton, M. Q. 2008. *Utilization-focused evaluation (4th ed.)*. Thousand Oaks, CA: Sage Publications.
 179. Patton, M. Q. 2011. *Developmental evaluation: Applying complexity concepts to enhance innovation and use*. New York: Guilford Press.
 180. Pawson, R. 2013. *The Science of Evaluation: A Realist Manifesto*. SAGE, London.
 181. Pawson, R. & N. Tilly. 1997. *Realistic Evaluation*. London: Sage Publications.
 182. People's Daily. 2013. *Building a learning, serving, and innovative Marxism Party*. March 19, 2013. <http://opinion.people.com.cn/n/2013/0319/c1003-20833304.html>. Accessed on April 12, 2020.

183. Peters, B. G., G. Capano, M. Howlett, et al. 2018. *Designing for Policy Effectiveness: Defining and Understanding a Concept (Elements in Public Policy)*. Cambridge: Cambridge University Press.
184. Peters, D. H., S. Elsharty, B.Siadat, et al. 2009. *Improving health service delivery in developing countries: from evidence to action*. Washington: the World Bank.
185. Petrick, R. L. 1981. Policy cycles and policy learning in the people's republic of china. *Comparative Political Studies*, 14(1), 101-122.
186. Plsek, P. 2003. *Complexity and the Adoption of Innovation in Health Care*. Paper presented to the conference: Accelerating Quality Improvement in Health Care Strategies to Speed the Diffusion of Evidence-Based Innovations, Washington DC, 27-28 January, 2003.
187. Plsek, P, & T. Greenhalgh 2001. Complexity science: the challenge of complexity in health care. *BMJ*, 323:625-628.
188. Polisen, J., T. Clifford, A.G. Elshaug, et al. 2013. Case studies that illustrate disinvestment and resource allocation decision-making processes in health care: a systematic review. *Int J Technol Assess Health Care*, 29(2):174–84.
189. Rodrik, D. 2008. The new development economics: We shall experiment, but how shall we learn? *Faculty Research Working Papers Series*. Harvard University; 2008.
190. Rodrik, D. 2013. The Past, Present, and Future of Economic Growth. *GCF Working Paper 1*, Geneva: Global Citizen Foundation, <http://bit.ly/1K6T5xK>.
191. Rouse, W. B. 2008. Health care as a complex adaptive system: Implications for design and management. *The Bridge*. 38(1): 17-25.
192. Rowe, R. & M. Shepherd. 2002. Public Participation in the New NHS: No Closer to Citizen Control? *Social Policy and Administration*, 36 (3), 275-290.
193. Sabatier, P. A. 1988. An Advocacy Coalition Framework of Policy Change and the Role of Policy-Oriented Learning Therein. *Policy Sciences*, 21: 129–68.
194. Sabel, C. & J. Zeitlin. 2008. Learning from Difference: The New Architecture of Experimentalist Governance in the European Union. *European Law Journal*, 14 (3), 271-327.
195. Sabik, L.M. & R.K. Lie. 2008. Priority setting in health care: Lessons from the experiences of eight countries. *Int J Equity Health* 7, 4, <https://doi.org/10.1186/1475-9276-7-4>.
196. Saich, T. 2011. *Governance and politics of China*. Basingstoke, Palgrave Macmillan.
197. Sanderson, I. 2002. Evaluation, Policy Learning and Evidence-Based Policy Making. *Public Administration*, 80 (1), 1-22.
198. Sanderson, I. 2009. Intelligent Policy Making for a Complex World: Pragmatism, Evidence and Learning. *Political Studies*, 57 (4), 699-719.
199. Savigny, D. D. & T. Adam. 2009. *Systems Thinking for Health System Strengthening*. Geneva: WHO.
200. Schmidt, V.A. 2002. Does Discourse Matter in the Politics of Welfare State Adjustment? *Comparative Political Studies*, 35 (2), 168-193.
201. Schön, D. A. 1975. Deutero-learning in organizations: Learning for increased effectiveness. *Organizational Dynamics*, 4(1): 2–16.
202. Schön, D.A. 1983. *The reflective practitioner: How professionals think in action*. New York: Basic Books.
203. Schön, D. A. 1987. *Educating the reflective practitioner*. San Francisco: Jossey-Bass.
204. Shang, C. 2018. Learning methodology promoted by Xi Jinping. [www.cpcnews.cn, 2018-10-9. http://theory.people.com.cn/n1/2018/1009/c40531-30330480.html](http://theory.people.com.cn/n1/2018/1009/c40531-30330480.html). Accessed on 2020-2-18.
205. Smith, G. D., S. Ebrahim & S. Frankel. 2001. How policy informs the evidence. *BMJ Clinical Research*, 322(7280), 184-185.
206. Snowdon, A. 2011. *Strengthening Health Systems Through Innovation Lessons Learned*. Ivey Centre for Health Innovation, University of Western Ontario: [S.I.].

207. Teets, J. 2014. *Civil Society under Authoritarianism: The China Model*. Cambridge: Cambridge University Press. doi:10.1017/CBO9781139839396.
208. The Chinese Communist Party and the State Council's Decision on Deepening Healthcare System Reform. *Xinhua News Agency*. April 6, 2009. Available at http://news.xinhuanet.com/newscenter/2009-04/06/content_11138803.htm. Accessed on July 28, 2011.
209. The State Council. 2018. *Notice of the Reform of the Shared Central-Local Responsibility of Financing and Delivering Public Services*. Guobanfa (2018) 6. http://www.gov.cn/zhengce/content/2018-02/08/content_5264904.htm.
210. Tian, C. & S. Song. 2011. Feasibility analysis of public procurement of MCH services in poor rural areas in Guizhou Province. *China Rural Health Management*, 31 (9): 969-971.
211. Tricco, A, J. Antony, W. Zarin, et al. 2015. A scoping review of rapid review of rapid review methods. *BMC Medicine*, 13: 224-239.
212. UNICEF, UNFPA, WHO, World Bank. 2010. *Packages of Interventions for Family Planning, Safe Abortion care, Maternal, Newborn and Child Health*. Geneva: WHO. https://apps.who.int/iris/bitstream/handle/10665/70428/WHO_FCH_10.06_eng.pdf?ua=1.
213. Van Ekdorn, L., Stenberg, K., Scherpbier, R. W., & Niessen, L. W. 2011. Global cost of child survival: estimates from country-level validation. *Bulletin of the World Health Organization*, 89(4), 267-277.
214. Visser, M. 2007. Deutero-learning in organizations: a review and a reformulation. *Academy of Management Review*, 32: 659-687.
215. Vuorenkoski, L., H. Toiviainen, and E. Hemminki. 2008. Decision-making in priority setting for medicines— a review of empirical studies. *Health Policy*, 86, 1-9.
216. Wagstaff, A., M. Lindelow, G. Jun, et al. 2009. Extending health insurance to the rural population: An impact evaluation of China's New Cooperative Medical Scheme. *Journal of Health Economics*, 28(1-19).
217. Walker, N., Y. Tam, I.K. Friberg. 2013. Overview of the Lives Saved Tool (LiST). *BMC Public Health*, 13 Suppl 3: S1.
218. Wang, S. 2003. Consensus decision-making in China. <http://www.aisixiang.com/data/65340.html>. Accessed on September 17, 2019.
219. Wang, S. 2008. Learning ability and adaptiveness: Implication of the Chinese Rural Cooperative Medical Scheme. *Social Science in China*, 6: 111-133+207.
220. Wang, S. 2009. Adapting by Learning: The Evolution of China's Rural Health Care Financing', *Modern China*, 35(4): 370–399.
221. Watt, A, A. Cameron, L. Sturn, et al. 2008. Rapid reviews versus full systematic reviews: An inventory of current methods and practice in health technology assessment. *Int. J Technol Assess Health Care*, 24:2, 133–139.
222. William, B. & I. Iman (eds.). 2007. *Systems concepts in evaluation: An expert anthology*. Point Reyes, CA: Edge Press of Inverness.
223. Wilson, E.C.F., J. Rees, R.J. Fordham. 2006. Developing a prioritisation framework in an English Primary Care Trust. *Cost Effectiveness and Resource Allocation*, 4: 3. 10.1186/1478-7547-4-3.
224. World Bank Group; World Health Organization; Ministry of Finance, P.R.C.; National Commission of Health and Family Planning, P.R.C.; Ministry of Human Resources and Social Security, P.R.C. 2016. *Deepening health reform in China: building high-quality and value-based service delivery*. Washington (DC): World Bank. <https://openknowledge.worldbank.org/handle/10986/24720S>.
225. World Health Organization. 2000. *The World health report 2000*. Geneva: WHO.
226. World Health Organization. 2011. *Essential Medicines*. Available at: http://www.who.int/medicines/services/essmedicines_def/en/index.html. Accessed August 3, 2011.
227. World Health Organization. 2015. *Every newborn action plan: progress report*. Geneva Switzerland: WHO.
228. World Health Organization, International Bank for Reconstruction and Development, World Bank. 2017. *Tracking universal health coverage: 2017 global*

- monitoring report. https://www.who.int/healthinfo/universal_health_coverage/report/2017/en/.
229. World Health Organization & UNICEF. 2014. *Every newborn: an action plan to end preventable deaths*. https://apps.who.int/iris/bitstream/handle/10665/127938/9789241507448_eng.pdf;jsessionid=D9520112E2E4E87B915B229DC338E1AE?sequence=1. Accessed on August 2, 2016.
 230. Wu, X., M. Howlett, and M. Ramesh. 2017. *Policy Capacity and Governance: Assessing Governmental Competences and Capabilities in Theory and Practice*. Springer.
 231. Wu, X, M. Ramesh & M. Howlett. 2015. Policy capacity: A conceptual framework for understanding policy competences and capabilities. *Policy and Society*, 34:3-4, 165-171, DOI: 10.1016/j.polsoc.2015.09.001.
 232. Xi, JP. 2007. *Zhijiang New Thoughts*. Hangzhou: Zhejiang People's Publishing House.
 233. Xi, JP. 2011. Go into matters deeply and seek truth from facts: Way to improve research capacity and outcomes. *The Central People's Government of the People's Republic of China*, http://www.gov.cn/jrzq/2011-09/01/content_1938597.htm. Accessed on April 12th, 2020.
 234. Xiao Y. Food safety regulation in the context of rapid change: The case of melamine contamination of milk in China. *IDS Master thesis*, MA 2009-2010, Science, Society and Development.
 235. Xiao, Y, K. Zhao, D.M. Bishai, D.H. Peters. 2013. Essential Drugs Policy in Three Rural Counties in China: What Does a Complexity Lens Add? *Social Science and Medicine*, 93:220-228.
 236. Xiao, Y., Husain, L. & Bloom, G. 2018. Evaluation and learning in complex, rapidly changing health systems: China's management of health sector reform. *Globalisation and Health*, 14, 112. <https://doi.org/10.1186/s12992-018-0429-7>.
 237. Yan, Y., S. Wang, and A. Hu. 2013. Evolution of the Chinese Policy Making Approach. *Journal of Tsinghua University (Philosophy and Social Sciences)*, 28(3): 114-123.
 238. Yang, H. 2015. Implementation mechanisms of innovative policies. *Journal of Renmin University of China*, 3: 100-107.
 239. Yang, L. 2011. Situation analysis of the maternal and child health service in rural areas in China. *China Health Policy Studies*, 4(10): 18-22.
 240. Yang, L, L. Sun, L. Wen, et al. 2016. Financing strategies to improve essential public health equalization and its effects in China. *Int J Equity Health*, 15:194. doi:10.1186/s12939-016-0482-x.
 241. Yin, R. K. 1997. Case study evaluations: A decade long progress? *New Directions of Evaluation*, 76: 69-78.
 242. Yin, R. K. 1994. *Case study research: Design and methods (2nd ed.)*. Thousand Oaks, CA: Sage.
 243. Yip, W. C., W. C. Hsiao, W. Chen, S. Hu, J. Ma, & A. Maynard. 2012. Early appraisal of China's huge and complex health-care reforms. *Lancet*, 379(9818), 833–842. doi:10.1016/S0140-6736(11)61880-1
 244. Yuan, B, D. Balabanova, J. Gao, et al. 2019. Strengthening public health services to achieve universal health coverage in China. *BMJ*, 365:l2358. doi:10.1136/bmj.l2358.
 245. Zhao, N. J. Sun, K. Zhao, et al. 2013. The status quo of maternal and child health investment in west China under the perspective of public finance. *Chinese Journal of Health Policy*, 6(3):56-60.
 246. Zheng, J. R. Li, Z. Chen, et al. 2018. *Piloting: Chinese Reform Experiences*. Nanking: Jiangsu People's Publishing House.
 247. Zheng, Y. 2016. *China's political innovation and experiments: What does it mean to the world?* <http://www.aisixiang.com/data/97987.html>. Accessed on May 21, 2019.
 248. Zhou, R. 2013. China reforms face 5 big challenges, with unprecedented complexity. www.cinic.org.cn.

- <http://www.cinic.org.cn/site951/cjtt/2013-05-31/653356.shtml>. 2013-5-31. Accessed on May 19, 2020.
249. Zhou, X. 2010. The institutional logic of collusion among local governments in China. *Modern China*, 36(1): 47-78.
250. Zhou H., W. Zhang, S. Zhang, et al. 2015. Health providers' perspectives on delivering public health services under the contract service policy in rural China: evidence from Xinjian County. *BMC Health Serv Res*,15:75. doi:10.1186/s12913-015-0739-x.
251. Zhuang, D. 2019. Effective learning is key to overcome "capability panic". *Economic Daily*, 2019-11-12. http://paper.ce.cn/jjrb/html/2019-11/12/content_405673.htm.
252. Zito, A.R. and A. Schout. 2009. Learning Theory Reconsidered: EU Integration Theories and Learning. *Journal of European Public Policy*, 16(8): 1103–23.