ABSTRACT

Empirical analysis of the connections between research and health policymaking is scarce in middle-income countries. In this study, we focused on a national multidrug-resistant tuberculosis (MDR-TB) healthcare provider training program in China as a case study to examine the role that research plays in influencing health policy. We specifically focused on the factors that influence research uptake within the complex Chinese policy making process. Qualitative data were collected from 34 participants working at multilateral organizations, funding agencies, academia, government agencies and hospitals through 14 in-depth interviews and two focus group discussions with ten participants each. Themes were derived inductively from data and grouped based on the "RAPID" framework developed by the Overseas Development Institute. We further classified how actors derive their power to influence policy decisions following the six sources of power identified by Sriram et al. We found that research uptake by policymakers in China is influenced by perceived importance of the health issues addressed in the research, relevance of the research to policymakers' information needs and government's priorities, the research quality, and the composition of the research team. Our analysis identified that international donors are influential in the tuberculosis (TB) policy process through their financial power. Furthermore, the dual roles of two government agencies as both evidence providers and actors who have the power to influence policy decisions through their technical expertise make them natural intermediaries in the TB policy process. We concluded that resolving the conflict of interests between researchers and policymakers, as suggested in the "two-communities theory", is not enough to improve evidence use by policymakers. Strategies such as framing research to accommodate the fast-changing policy environment and making alliances with key policy actors can be effective to improve communication of research findings into the policy process, particularly in countries undergoing rapid economic and political development.

INTRODUCTION

Recognizing the important role of research in setting priorities and informing resource allocation decisions particularly in resource-constraint settings (Cordero et al., 2008; Syed et al., 2008), donors and researchers have increasingly called for using research evidence to inform health policy decisions (Uneke et al., 2015). However, a literature review identified that the level of using research to inform health policies in low and middle-income countries (LMICs) is not optimal and that existing evidence does not always provide information that is critical or accessible to policymakers (Hawkins & Parkhursk, 2016; Weiss, 1979). Common barriers influencing research uptake within the policymaking process still exist, including lack of timeliness in presenting study results, few communication channels, different conceptions of risk, and mutual mistrust between policymakers and researchers (Innvaer, Vist, Trommald, & Oxman, 2002; Lavis et al., 2005). Most empirical analysis of the connections between the use of research evidence and the adoption of policies has been conducted in high or low-income countries (Burris, Parkhurst, Adu-Sarkodie, & Mayaud, 2011; Hutchinson et al., 2011; Tulloch et al., 2011). In middle-income countries, studies examining the public policy process showed how international donors and think tanks influenced the policymaking process (Fischer & Plehwe, 2017; Handlin, 2015; Pérez-Escamilla et al.; Tran et al., 2017).

Both international and domestic researchers have attempted to illustrate the health policymaking process in China by documenting and accounting the context and the process of how new policies are formulated and translated into practice (He, 2018; Kornreich, Vertinsky, & Potter, 2012; Korolev, 2014; Y. Liu & Rao, 2006; Tang, Brixi, & Bekedam, 2014). As described in one study, the national policymaking process in China follows three steps (Y. Liu & Rao, 2006). First, the State Council commissions relevant ministries to draft policy documents in line with the national priorities. A national agency usually serves as the coordinator (Y. Liu & Rao, 2006). Second, several rounds of meetings for discussing the details of the policy drafts are held before the policies are finalized (Y.

Liu & Rao, 2006). Third, once an agreement is achieved, the new policies are announced through public conferences. (Y. Liu & Rao, 2006) In the health policymaking process, we have seen that research conducted by universities, national agencies or think tanks played critical roles in shaping the national priorities and influencing the formulation of policy drafts (He, 2018; Kornreich et al., 2012; Tang et al., 2014). By adopting this evidence-based approach, the policymakers in China have strengthened the health system by addressing some of the pressing issues, such as using an innovative financing scheme to provide health insurance for rural population and developing a national system to supply affordable essential medicines (Y. Liu & Rao, 2006; Tang et al., 2014). Additionally, researchers shared the lessons drawn from their successful experiences of translating research into policy and practice, such as undertaking policy relevant studies and conducting timely research dissemination (He, 2018; Y. Liu & Rao, 2006; Tang et al., 2014).

However, only limited studies examined the research-policy links from the perspectives of the users - policymakers. To our knowledge, only two qualitative studies focusing on investigating policymakers' opinions on the facilitators and barriers that influence research uptake in the policymaking process have been conducted in China (D. Liu, Yuan, Wang, Liu, & Zhou, 2007; Wang, He, Zhu, & Zhu, 2011). We found that in these two studies, policymakers, who are mostly administrative officials working in the provincial and local bureaucratic system, are too narrowly defined. As there is a growing body of literature unveiling the black box of China's policymaking process, it is widely accepted that policymaking in China is shifting from a centralized policymaking process dominated by political and administrative elites to a more open and pluralistic model influenced by a variety of actors, such as experts, the media, and international organizations (Ma & Lin, 2012).

In this study, we focused on a national multidrug-resistant tuberculosis (MDR-TB) healthcare provider (HCP) training program in China as a case study to explore the factors that influence

research uptake in the policy setting using a widely-accepted analysis framework. Furthermore, from shared experiences and lessons provided by Chinese policy actors, we developed practical strategies to facilitate and strengthen research uptake in the health policymaking process.

To understand the role that research plays in influencing policy, researchers have proposed various frameworks and models. For example, Weiss in 1979 postulated six models of research utilization (Weiss, 1979). In that same year, Caplan proposed the two-communities theory to elucidate the fundamental reasons for the lack of research use in the policy process (Caplan, 1979). The two-communities theory emphasizes the idea that being two separate communities, researchers and policymakers operate in different cultures; have conflicting values; engage in different activities; have different attitudes to research; and they have different priorities and accountability mechanisms (Caplan, 1979).

More recent studies have suggested that previous theories often overlooked the complex environment where research is conducted and how policy decisions are made (Bowen & Zwi, 2005; de Goede, Putters, & van Oers, 2012). As emphasized by Bowen and Zwi, because policymaking context is usually fast-changing, considering how research evidence fits into context is critical to understand its uptake (Bowen & Zwi, 2005). Additionally, several studies supported the idea that knowledge generated from research is highly context sensitive, and that the application of this knowledge in another context can change its value (Bal, Bijker, & Hendriks, 2004; Lin & Gibson, 2003). Furthermore, since 2000, researchers have called for a social network approach to studying research use in the policymaking process since the boundaries of researchers and policy makers are considered fluid and have become more blurred in recent years (Davies, Nutley, & Smith, 2000; Hanney, Gonzalez-Block, Buxton, & Kogan, 2003).

METHODS

To achieve our study objectives, we used the Chinese TB policymakers' perception of the usefulness of evidence from training evaluations for making resource allocation decisions as a case study to identify factors that influence research uptake in the health policymaking process in China. Therefore, we adopted the instrumental case study approach, which seeks to gain a broader understanding of a phenomenon through a particular case and generates findings transferrable to other contexts (Stake, 1995).

The case study setting: making investment decisions on a national HCP training program in China

China ranks the second highest country with MDR-TB - caused by bacteria resistant to two of the most powerful anti-tuberculosis (TB) drugs, isoniazid and rifampicin – with an estimated of 73,000 incident cases in 2016 (WHO, 2017). Lack of skilled HCPs in peripheral areas and inadequate service quality are the major challenges for China to reduce both TB and MDR-TB epidemics (Comolet, Rakotomalala, & Rajaonarioa, 1998; Johansson & Winkvist, 2002). The centralization of MDR-TB services causes both physical and financial barriers for rural patients to access MDR-TB care (Li et al., 2012; Long, Smith, Zhang, Tang, & Garner, 2011). Therefore, innovate service delivery models that aim to decentralize TB/MDR-TB services have been designed and piloted in several provinces since the 2000s (Zou, Wei, Walley, Yin, & Sun, 2012).

Since China adopted the DOTS strategy in the 1990s, the China CDC has collaborated with international funders and NGOs closely. As a result of the increasing domestic funding for TB over the years, TB diagnosis (including X-ray examination and sputum smear tests) and the first-line TB drugs are provided free of charge at the TB dispensaries and designated hospitals under the national TB control and prevention strategy. However, there is no designated funding for MDR-TB diagnosis and treatment from the national government. This gap was filled by several interventional programs

funded by international donors, such as the Bill and Melinda Gates Foundation and the Global Fund to Fight AIDS, TB and malaria, since 2006. Today there remains a shortfall of funding to sustain MDR-TB control activities and MDR-TB control is still relying on funding from international donors.

In 2015, the National Center for TB control of the Chinese Center for Disease Control and Prevention (NCTB), the national Clinical Center for TB control of the China CDC (CCTB), and the Lilly MDR-TB Partnership collaboratively initiated a training program targeting TB HCP particularly in peripheral healthcare centers and hospitals. The aim of the program was to standardize MDR-TB diagnosis and improve case management by HCPs in China. This national training program was critical to the successful reform of the service delivery system because a shortage of well-trained HCPs at lower level facilities might hinder the possibility of decentralizing MDR-TB services. To inform decisions on nationwide implementation of the training program, pilot sites were established in six provinces across China. In each province, clinical doctors, nurses, and local CDC staff who were involved in delivering care to MDR-TB patients in local CDCs and TB designated hospitals were included in the training program. As the program and the funding from the donor ended in 2017, a decision needs to be made by the policymakers in China whether the program could be sustained and even scaled up to other provinces using internal funding from the National Health and Family Planning Commission (NHFPC). To provide evidence for the policymakers to make this decision, a policy-relevant evaluation of the pilot training program was needed.

Data collection

Data was collected from three main sources: semi-structured interviews, focus group discussions with key policy actors, and a review of government documents. In this study, we define policy actors broadly as decision-makers who directly authorize and inform health policy or program formulation, resource allocation and individuals or groups who have knowledge, indirect influence or are affected

by policymaking making processes (Khan, Meghani, Liverani, Roychowdhury, & Parkhurst, 2018; Shannon, 2003).

In 2016 and 2017, we conducted a qualitative study with policy actors of the MDR-TB HCP training program. We also included some interviewees who are external to the program but could provide information on the contextual factors that shape the policy process. A purposive sampling approach was used to identify key policy actors. A total of 34 participants were recruited and participated in the study, including international actors based in multilateral organizations, funding agencies, and the academic sector and national actors, such as directors of provincial and national CDCs in China, high-level representatives of the CCTB, and senior staff at tertiary hospitals leading HCP training programs. A detailed description of study participants is shown in Table 1. Participants were contacted and recruited through conference calls and email. Oral consent to participate in the study was obtained prior to the study. We conducted fourteen face-to-face semi-structured in-depth interviews (IDIs) and two focus group discussions (FGDs) with ten participants each. Topics covered in the IDIs and FGDs included: contextual factors affecting the policy process, limitations of current training evaluation approaches, information needed to determine if a training program is successful, factors policy actors consider important when presented with an evaluation report, how policymakers and researchers interact, and how policy actors weigh different sources of information. The majority of interviews were conducted in Chinese by SW, and four interviews were conducted by HL-Q in English. All interviews were audio-recorded and transcribed into Chinese and English.

In addition to the interviews and FGDs, we reviewed documents from government websites pertaining to the national MDR-TB HCP training program, roles and responsibilities of the involved agencies as a way of triangulation for and complementary to the data from IDIs and FGDs.

The research was approved by the Institutional Review Board of the National University of Singapore and the London School of Hygiene and Tropical Medicine. Information sheets that summarized the objectives and methods of the research and consent forms were provided to the participants. Participants were informed of the confidentiality and anonymity of their responses. To ensure confidentiality, participants were de-identified and numbered during transcription.

Conceptual framework

During data analysis, we reviewed frameworks from literature and searched for the appropriate one that we could use to group the emerging codes and subthemes emerged. We first identified frameworks that focus on the on the dynamic relationships between actors involved in research use and the policy formulation process. For example, the research utilization framework proposed by Kim et al. is a four-phase model that illustrates the process of translating research evidence into policies and practices (Kim et al., 2018). Different from other more theoretical models, this framework is particularly useful in real-world settings with its emphasis on evidence use throughout program cycles. Another notable framework is the knowledge translation model developed from a systematic literature review by Orem et al., which identified eight groups of factors facilitating research evidence use in the policy process, such as strengthening institutional capacity for knowledge translation, setting priorities at pre-research stage, political and economic context (Orem et al., 2012). Employing a qualitative approach to engage inputs from policymakers in Uganda, the authors further refined this framework to fit low-income settings, where external donors had strong influences on the health policy development and implementation.

Compared to the above-mentioned models and frameworks for explaining and facilitating research use in the policy process, the four-dimensional model developed by the Overseas Development Institute (ODI) resonated with our data. The Research and Policy in Developing countries (RAPID) framework emphasizes the relationship and communication channels between researchers and

206 policy actors as key components, as well as the nature of the evidence and the contextual factors
207 influencing such interactions (Crewe & Young, 2002). It was based on 50 case studies examining how
208 research evidence was taken up and influenced policy decisions (Burris et al., 2011), and widely
209 applied in the empirical analysis of the research-policy links in LMICs (Crichton & Theobald, 2011;
210 Hutchinson et al., 2011; Tulloch et al., 2011). With its simplicity and validated applicability in low-
211 and middle-income settings, the framework provides a general scaffold for researchers to develop a
212 wide range of pathways of research adoption in different policy contexts and facilitates the
213 comparison of studies conducted in different countries.
214
215 The RAPID framework highlights that the factors that influence research uptake by policy actors can
216 be summarized in four dimensions: external environment, political context, evidence, and links
217 (Start & Holvland, 2004). External environment describes the global socio-economic trends, or the
218 influence exerted by international actors on the policy process (Start & Holvland, 2004). Political
219 context refers to the environment under which research and policymaking are shaped (Court, 2006;
220 Crewe & Young, 2002). Examples of policy context include organizational pressures, social and
221 cultural context, and whether a policy is implemented thoroughly in practice (Crichton & Theobald,
222 2011). The nature of evidence, such as credibility and the way it is communicated to policy actors,
223 also determines the usefulness of the research findings. Finally, the "links" in the RAPID framework
224 refers to the relationship and communication channels between researchers and policymakers
225 which are also critical components of the research-policy interface (Crewe & Young, 2002). To
226 understand "links", researchers need to examine, for example, who are the actors making policy
227 decisions; what power do they have to influence policies; and if there are intermediaries or
228 "knowledge brokers" between decision-makers and evidence providers (Start & Holvland, 2004). In
229 this context, policy networks are sets of relatively stable relationships formed by actors who share
230 common interests or exchange resources to achieve a common policy outcome (Börzel, 1997). Based
231 on our understanding of the policy actors' responsibilities in the training program and the TB control

system, we further classify how actors derive their power to influence policy decisions following the six sources of power identified by Sriram et al (2018). These include technical expertise, bureaucratic power, political power, financial power, network and access, and personal attributes (Sriram et al., 2018).

Analysis

All interviews and FGDs were conducted in Chinese by the first author, and transcripts were translated into English by the first author (a native Chinese speaker). To reduce error in translation, the first author consulted another Chinese native speaker on terms and sentences that the first author was not sure how to translate. Data from documentation was also translated into English and used to supplement the data from interviews and FGDs.

Data from IDIs and FGDs was analyzed using a mix of inductive and deductive approaches. Translated transcripts were imported into NVIVO 11 Software and coded inductively line by line by two researchers independently. Codes were compared and further merged into subthemes using an iterative process. The subthemes which were identified inductively were further grouped into the four themes of the RAPID framework. Policy actors' roles and their sources of power in making decisions on TB programs and policies were synthesized based on information from all data sources. For IDIs, each excerpt includes the interviewee's ID number and his/her occupation so that extracts from the same individual can be linked. For FGDs, quotes are identified by the focus group number and participants' ID number. In this study, saturation was defined according to the concept of the priori theoretical saturation that pre-determined theoretical categories are adequately represented and exemplified by lower-level codes and themes derived from the data (Saunders et al., 2018). We believe the four constructs of the RAPID framework were adequately represented by our data including rich descriptions of each of its components and subthemes.

RESULTS

The findings are presented according to the four themes of the RAPID framework in the following order: external environment, political context, evidence and links. We inductively identified several subthemes for each main theme. In the first theme, external environment, we describe the influence of international donors on priority setting. Subthemes related to political context included the government prioritization of health issues and the governments' perception of the urgency to address the health issue. Relevance to policy actors' information needs, credibility perceived by policy actors, and the composition of research team were identified as key evidence subthemes. Finally, subthemes related to links involved the distinct roles and responsibilities of policy actors and the links, power relations, and networks of the policy actors involved in the training program.

External environment

Influence of international donors on priority setting

The priorities in the TB prevention strategy were determined by the national government, but influenced by international donors. One international policy actor mentioned that funding from international donors for communicable diseases is decreasing in Asia and that it is common that countries with rapid economic growth will eventually lose funding from donors. However, most of the international policymakers acknowledged that China still receives a large amount of funding from international organizations despite its rapid economic growth. One of the reasons for this, as one participant surmised, could be that it would be easier to implement pilot programs or experimental reforms using foreign loans or funding than using domestic resources. Another reason, as pointed out by one Chinese policy actor, was that due to the heavy TB burden in China, particularly with the emergence of more complicated subtypes of TB, resources solely from the national government could hardly sustain comprehensive control programs to tackle the health issues at national scale.

Therefore, financial support from international donors was still considered relevant in determining the types and scale of health programs to be implemented in China, through which donors directly influenced the issues to be prioritized. The policy actors we interviewed acknowledged that since the 1990s, the NCTB started partnership with donors such as the World Bank, the Global Fund and the Bill and Melinda Gates Foundation, who provided both financial and technical support in TB control at national scale. For example, the World Bank project built infrastructure for TB prevention and control covering county-level CDCs, community and village health centers, provided free diagnosis and drugs for TB patients, and offered stipend for transportation to TB designated health centers (Kong, Zhang, Wang, & Jiang, 2011). The project was highly praised by the Chinese government because it facilitated improvement of DOTS coverage, case detection, and established a country-specific model of case management that was later deployed nationwide (Finance Department of Henan Province; Kong et al., 2011). Apart from their direct influence through funding disease-specific programs, international donors often indirectly shaped the evidence base to inform future policies or agenda setting through producing evidence from their funded programs. For example, one policy actor commented that if evidence showed that the programs funded by the donors were effective, the national government would be more willing to invest in similar programs:

> *"The NHFPC and Ministry of Finance (MOF) saw the effectiveness of investment, then they decided to allocate more funds for TB control. And the funding has increased gradually each year. […] Because of the impact of the international programs, the Chinese government was able to understand that you have to invest money so that the work can be done. And it further promoted the implementation of TB interventions and programs." – IDI 2, CCTB official*

However, as commented by a few international policy actors, the influence of international donors was much less in China than in other developing countries, because donors were working in a unified way, thus exerting more leverage with local governments, in low-income countries.

"In very low-income countries, you find the donors work together because they have the opportunity to really have an impact on the government. If they line up together, they can have a huge impact on the government. In China, there's no donor coordination. It's really falling off because they're becoming richer and they're starting to play off the donors." – IDI 14, Academia

International donors are strongly influential in setting priorities in TB control in China through either funding the health interventions of their interest or shaping evidence base to inform future policies.

Political context

Alignment with government priority

Several policy actors described the important role of political context in shaping their attitudes towards research evidence. They emphasized that the relevance of the research presented - in our case study, results from evaluation studies - depended on whether the health intervention was in line with government's priorities. According to a description given by one interviewee, a commitment to tackle TB and reach 90% DOTS coverage was made by the Minister of Health at the Ministerial Conference on Tuberculosis and Sustainable Development in 2000. Because of increased political commitment, TB control became a priority and was included in the national five-year and ten-year plan issued by the state council of China since then. As a consequence, the funding for TB control from the national government increased each year. In 2011, the state council announced the "five-year plan for the national TB prevention and control", in which the government highlighted work priorities for TB control and announced targets to be reached at the end of 2015. Most policy actors from the NCTB and CCTB confirmed that strengthening human capacity for TB control was one of the government's interests and priorities in the "five-year plan" (State Council of China, 2011). As a result, HCP training programs were conducted throughout the years, although the coverage of the programs varied depending on the availability of the funding allocated annually. The

next quote highlights how training programs remain a priority as it is part of a broader policy supported by the government:

> *"One of the key programs is the training program. […] So no matter how much you are funded, the training will be part of the overall TB control intervention, but its proportion will not change much. If the scale of the TB control intervention is increased with more funding, the investment in training will not change much." – IDI 2, CCTB official*

Importance and urgency on the need to address the health issue

The value of research perceived by policy actors is influenced by the urgency of the health issues that the research aims to address. All policy actors we interviewed acknowledged that training HCPs was a critical factor for ultimately reducing MDR-TB epidemics in China. They emphasized that doctors from peripheral health facilities, particularly in less developed regions in China, were in need of systematic training to provide quality MDR-TB services, which would also facilitate achieving the TB prevention targets at the endpoint of the "five-year plan". Therefore, the policy actors were interested to know whether the program effectively improved trainees' knowledge and skills on MDR-TB diagnosis and treatment. The next quote summarizes the sentiment of several interviewees where they regarded training as a key priority due to the need to standardize MDR-TB diagnosis, treatment and management:

> *"Especially, HCPs need training for standardized MDR-TB diagnosis, treatment and management. The HCPs in eastern provinces, which are highly developed, can learn and apply the latest knowledge and techniques quickly. But in the western provinces, if you don't invest resources and funding for them to conduct training, they don't even have the facilities or equipment.."—IDI 10, NCTB official*

With only limited resources available, TB interventions often face competition with interventions for other infectious diseases, such as HIV and Hepatitis B, for government funding. To ensure solutions

are proposed and resources are allocated to address the TB epidemics in China, political commitment by the national government is critical. Without political commitment to tackle health issues, policymakers will have little interest in investing resources or obtaining research evidence to inform policy.

Evidence

Relevance to policy actors' information needs

One of the major determinants of the usefulness of research evidence was whether research findings addressed policy actors' information needs. For example, when evaluating a training program, most policy actors we interviewed found that the assessment of the four basic outcome levels suggested in the Kirkpatrick Model did not provide enough information that they were interested. As a classic framework for training evaluation, the Kirkpatrick model defines that the effectiveness of a training program can be assessed by four indicators: trainees' affective reaction to the program, their knowledge improvement, on-the-job behavior change after training, and the organizational impact of the training program (Kirkpatrick, 2006). Thus, evaluation based solely on this framework was perceived less useful when determining the future of the training program. Even though no consensus on the optimal indicators and approach to evaluate effectiveness, most policy actors in both FGDs agreed that they were interested in information that would help them determine the sustainability and scalability of the training program, including the cost-effectiveness of running the training program, the willingness of international donors to invest in the program in long-term, and whether the program could be easily applicable to other settings. The next quotes highlight the several areas that interviewees mention as being crucial for policymakers:

> *"In order to persuade the government to invest, we probably do a cost-effectiveness analysis to show how much we invest and input, which would impress the policymakers." – FGD group A, ID4*

"We need to know if the program is applicable to other settings. If this program targets the issues in only one or two provinces, then it is not worth scaling-up." – FGD group B, ID4

Credibility perceived by policy actors

In addition to the relevance of the research to policy actors, we also found that the scientific quality of research would influence its perceived credibility and thus determine whether the results would be useful in the policymaking process. In our scenario, most policy actors were concerned with the design and validity of the evaluation approach, including whether the indicators used were able to reflect measured outcomes objectively, whether the methods were validated and whether confounders were taken into consideration. The next quote illustrates policy actors' concerns about the credibility of the research:

We think this outcome indicator [case detection] is important, but we are not sure if this indicator is able to reflect the results of this training objectively, which is the problem. – FGD group B, ID 8

Composition of research team

Apart from the scientific quality of the research, most policy actors were interested in who conducted the research. Several policy actors mentioned that although local researchers might be familiar with the local system, culture and language, they were concerned that the close relationships between researchers and the local managers of training programs would cause bias in the assessment. Most policy actors suggested that international researchers were able to conduct more objective studies compared to local researchers since they held no conflict of interests. In addition, specific respondents highlighted that the reputation and international impact of international researchers would raise the credibility of the evaluation results (FGD Group A, ID1 and ID7). However, some participants were also concerned that international researchers were limited by their knowledge of local culture and language, which would impede the progress of the

evaluation. Therefore, as quoted below, a consensus was made across interviews and FGDs that a mix of international and local researchers in the research team would be ideal.

> *"A collaboration will be better, because the methodology used for evaluation by international researchers would be more robust, even though the process (of evaluation) might be complex. Researchers in China are more familiar with the local context." – FGD, Group B, ID7*

Links, networks, and power relations

Roles and responsibilities of policy actors and their major sources of power

Examining the identities and responsibilities of actors involved in making health policy decisions is important to understand how policy change occurs and how information is transferred in the process. In our analysis, we identified key policy actors involved in the HCP training program and they shared their views on their roles in this training program and TB control system (table 2).

Policy actors such as international donors, NHFPC, MOF, TB experts, NCTB and CCTB played important roles in making decisions on the training program and TB policies. Both NCTB and CCTB are operated under the China CDC system. As the head of the regional CDC network, the NCTB is responsible for the public health aspects of TB control; while the CCTB, also the headquarter of the Chinese Medical Association TB division, is responsible for the clinical aspect.

As described by one Chinese policy actor, it was usually the NHFPC who initiated policymaking and were responsible for organizing meetings with relevant agencies to discuss policy details and draft documents. The national TB prevention plans (such as the "five-year plan"), in which work priorities and targets were established, was drafted and developed by the NHFPC with input from TB experts in reputable research institutions, NCTB and CCTB. Identified themselves as "consultant of NHFPC", participants from both the NCTB and CCTB were involved in conducting TB related research and

national surveys, and collecting research evidence to justify policy advocacies. As discussed previously, because of the limited resources and funding provided by the national MOF, the NCTB and CCTB established collaboration with international donors, who provided additional funding for TB programs across the country. For these collaborated TB programs (such as the Lilly MDR-TB HCP training program), the NCTB and CCTB took the leading role in designing and planning the programs. Additionally, both agencies were responsible for supervising and evaluating the programs during and at the end of implementation.

Even though not directly involved in the decision-making process, senior staff at TB designated hospitals reported that they were able to raise issues encountered during the implementation of TB programs or policies to TB experts and officials from NCTB or CCTB during workshops or conferences so that their opinions could pass to higher level decision-makers. However, grassroots doctors who were responsible for frontline clinical work and research were not reported to be involved in the decision-making process and had not yet seen any influence over decisions on the HCP training programs or other TB policies.

Policy actors' major sources of power

The power of policy actors derives from difference sources, such as resources, knowledge or personal attributes (Sriram et al., 2018). We listed the major sources of power for each actor in table 2. As the two major funding sources for TB control activities, international donors and MOF draw power from their ability to mobilize financial resources. The power of the NHCF on setting national policy priorities and TB control strategies derives from its authority in the bureaucratic and administrative system through which health policies are formulated and implemented. With their ability to produce information and in-depth knowledge and experiences of clinical and epidemic TB control, the NCTB, CCTB, experts and provincial CDCs exert power on TB programs and policies through their technical expertise. Additionally, NCTB and CCTB have the bureaucratic power granted

by their position in the administrative system as they have the authority to design and implement TB programs and policies. However, the roles of TB designated hospitals and grassroots doctors in the decision-making process are not comprehensively discussed based on the available data in our study, thus, their sources of power cannot be clearly accounted for.

Links between policy actors involved in the training program

The structure of the policy actors involved in the TB policymaking process in China is shown in figure 1. Determined by their positions and power in the health system, the MOF and NHFPC are the top-level policymakers, setting the policy priorities and leading the development of national TB control strategies. Having both technical and bureaucratic power in the TB control system, the TB experts, NCTB and CCTB are the high-level policy actors who work closely with the top-level policymakers, as they play advisory roles to the top-level policymakers and are responsible for drafting policy documents and national guidelines. The top- and high-level policy actors are directly involved and most influential in the TB policymaking process. The lower-level policy actors include provincial CDCs, TB designated hospitals and TB doctors, as their major roles is providing TB related services and implementing the policies and programs formulated by the higher-level policy actors. Although the lower-level policy actors are not always involved in the decision-making process directly, they can indirectly influence the TB policies through their technical power, thus having relatively less impact on the policymaking process. As external policy actors, international donors do not directly participate in the policymaking process in China, but can exert influences through their connections with the higher-level policy actors and financial power.

The NCTB and CCTB are in the center of the policy network linking the other actors who are involved in making decisions on TB programs and policies, as one of the officials from CCTB described their position in the national TB control system as such:

"We are working from the upper level. We work with MOH (now known as NHFPC) *and also work with the provincial, prefecture and county level TB hospitals. And of course, we have a lot of communication with the CDC system." – IDI 4, CCTB official*

Leaders in the two agencies are influential in formulating TB policies and programs through their roles as advisers to higher level policymakers in the NHFPC. They are also informed on the progress of t frontline TB control work and the progress of TB research through their networks with universities and TB designated hospitals. Furthermore, both agencies had direct contact with international donors, thus connecting the donors with the NHFPC and MOF.

DISCUSSION

Our study identified the critical roles of the NCTB and CCTB in making decisions on TB policies and programs around two key areas. Firstly, as both producers and users of research evidence, the two agencies have power and influence in the TB policy process through their technical expertise. Secondly, having connections with other policy actors, the NCTB and CCTB hold a central position of disseminating information within the TB control system. Additionally, we found that international donors have a strong influence on setting TB control priorities in China, which in turn will influence domestic policymakers' perception of the value of the research because policymakers are interested in studies that address government priorities. Table 3 summarizes the major findings of our study according to the four elements of the RAPID framework and we made our recommendations to improve research use based on these findings.

The two-communities theory explains why research is not used in the policy process by attributing non-utilization to the differences in culture between researchers and policymakers (Caplan, 1979). However, as criticized by Wingens, since the theory focuses on the differences of researchers' and policymakers' practice, it fails to capture the intrinsic differences in functionality of "research" and "policy" (Wingens, 1990). Thus, even though the theory still holds true to some extent, its

generalizability is limited. For example, one of the central arguments of the theory is that researchers and policymakers are two distinct homogenous groups; however, our study suggested that the identities of "researcher" and "policymaker" are sometimes not mutually exclusive. As indicated in our study, key member from the NCTB or CCTB are both "researchers" and "policymakers": they have the power of making decisions on TB control strategies conferred by their technical capacity and institutional position in the health system, but are also involved in conducting research, providing important evidence for making decisions for higher-level policymakers.

Mirroring the roles of the epistemic community, the two government agencies, the CCTB and NCTB, have the expertise and authoritative claim to knowledge about TB prevention and control. They can influence higher-level policymakers either by directly providing information of policymakers' needs or illuminating the importance of an issue from which the policymakers can deduce their interests and needs. Even though government agencies are important sources of research information (Sorian & Baugh, 2002), their how to engage them to facilitate research uptake by policymakers are not sufficiently examined and discussed in current literature. The use of knowledge brokers, who are usually hired externally by research institutions for facilitating interactions between decision-makers and researchers, was seen in several developed countries and LMICs (Knight & Lyall, 2013; Mc Sween-Cadieux, Dagenais, Somé, & Ridde, 2019). Compare to knowledge brokers, staff from the two agencies have the following advantages as natural intermediaries. Firstly, through years of working in the TB control system with people from NHFPC, lower level CDCs, hospitals and even international donors, both agencies already built personal and formal communication channels to circulate information to colleagues and partners. Secondly, although the use of knowledge brokers was piloted and proved to be successful in a number of research institutions in UK and Canada (Dagenais, Laurendeau, & Briand-Lamarche, 2015; Lightowler & Knight, 2013), the sustainability of knowledge brokers roles is still challenging due to ambiguity in their professional boundaries, career pathways, recruitment criteria and management (Chew, Armstrong, & Martin, 2013). Therefore, we

recommend that without the immediate availability of knowledge brokers, partnership can be established with natural intermediaries, for example, staff from the NCTB or CCTB in our context, to facilitate the dissemination of research findings. Specifically, as summarized in table 3, researchers can engage officials from the NCTB or CCTB in designing and conducting research projects. Interacting and building personal relationships with TB experts or officials from the two agencies are also helpful to increase the use of research by policy actors.

Our study supports findings from previous studies that the perceived value of research to policymakers is determined by whether the research addresses a health issue that is in line with government priorities (Burris et al., 2011; Crichton & Theobald, 2011; Hutchinson et al., 2011). In our case study, we found that similar to other aid-dependent countries, international donors are strongly influential in setting priorities and agenda in TB control in China through funding the health interventions of donors' interests or shaping evidence base to inform future policies, even though its perceived influence is less in China and middle-income countries than in low-income countries (Khan et al., 2018). Today TB (particularly MDR-TB) control in China is still largely relying on funding from international donors. Since China is gradually acknowledged as one of the emerging economic power globally and is expected to step up and take the ownership of national disease control by increasing its spending on TB, how it will influence donors' resource allocation decisions in China in the future is still unknown. However, we cannot discard the possibility that if foreign aid declines, policymakers will likely need to reset the TB control priorities since there will be less influence from international donors but a large funding gap for disease control activities. If this is the case, the government needs to make two decisions. For the short-term, if no imminent investment in MDR-TB control from either the national government or international donors is committed, the policymakers need to carefully determine what interventions are essential and where to use the very limited available resources to achieve the optimal outcomes. For the long-term, in line with the ongoing comprehensive health

system reform that emphasizes the leading role of government in funding and supervision, an innovative financing mechanism that utilizes domestic sources (for example, health insurance schemes, central and local public health funding) needs to be established to support sustainable, affordable and quality MDR-TB services. To accommodate to the fast-changing policy context, we recommend researchers to conduct a rapid assessment of the policy context as suggested in table 3. Furthermore, the private corporate actors are seen to exert influence on the public sector in several LMICs through corporate policy entrepreneurship, a processes in which "private sector organizations undertake a set of strategies that result in innovate activities in the public arena". One example is the adoption of mobile healthcare payment innovation by the public hospital systems in China. Therefore, drawing on lessons learned from policy entrepreneurs, health researchers may seek opportunities for policy influence proactively, instead of waiting passively for their research to be discovered by policymakers.

Consistent with previous studies, our findings indicated that perceived relevance was one factor for research use in policy decisions and that the scientific quality of research will influence its credibility perceived by policy actors (Crichton & Theobald, 2011; Innvaer et al., 2002; Lavis et al., 2005). Contrary to one study which showed that the perceived quality was largely determined by the reputation of the researchers and the journal where the study was published (Trostle, Bronfman, & Langer, 1999), our study found that the policy actors in China are more interested in the validity of the study design and the interpretation of the results. Furthermore, although it is found in previous studies that research results too complex and technical to be understood by policy actors are unlikely to be used in policymaking process (Poot et al., 2018; Sorian & Baugh, 2002), the ability of policy actors to interpret results was not discussed in our study. This is probably because all the participants in our study have medical backgrounds and are specialized in TB control, they tend to assess the usefulness of research evidence from a technical perspective. In summary (shown in table

3), well-designed studies that target policy actors' information gap are more likely to be used in the policymaking process. To further increase the perceived credibility, we recommend that study results need to be critically interpreted and justified.

Our study has a number of limitations. First, we acknowledge that different systems are deployed for the management of infectious diseases and non-communicable diseases. Thus, key stakeholders involved in making policy decisions on non-communicable diseases may be different and need to be examined in futures studies. Second, as acknowledged by other researchers, one of the challenges to conduct policy analysis is to obtain access to domestic policy elites (Walt et al., 2008). In our case, we were unable to include some of the higher-level actors involved in making decisions on TB policies, such as officials from NHFPC or MOF. Therefore, their views on research evidence and their roles in the TB policy process are not comprehensively examined. Third, since our study is a case study of a national HCP training program, the topic guide used in the IDIs and FGDs was designed with an emphasis on the specific program. However, based on the definition of the priori thematic saturation (Saunders et al., 2018), we believe we achieved saturation since the four constructs of the RAPID framework were adequately represented by our data. Finally, although, in this study, we investigated factors influencing research uptake by health policymakers in China, unfortunately, we were not yet updated whether the HCP training program was sustained or scaled-up. To broaden the scope of our study, a network or stakeholder analysis could be conducted in future to systematically examine all the key players involved in the TB policy process in China.

CONCLUSION

This case study of policy actors' perception on using evaluation evidence to make resource allocation decisions on a national MDR-TB HCP training program in China highlighted areas that could be targeted to improve research use in the health policymaking process in the Chinese context. The usefulness of research is determined by its context – whether it addresses a national priority that is

shaped and set by not only local policymakers but also international donors – and its scientific quality. For researchers, apart from improving the relevance and robustness of research studies, it is important to assess the policy context and frame the research scope to align with government priorities. Furthermore, we highlighted the dual roles of two agencies in the TB policy process in China as they are both evidence providers and actors who have the power to influence policy decisions through their technical expertise. Without the immediate availability of knowledge brokers, making alliances with existing key actors is an effective way to improve communication of research findings into the policy process.

References

Bal, R., Bijker, W., & Hendriks, R. (2004). Democratisation of scientific evidence. *British Edical Journal, 329*, 1339-1341.

Börzel, T. (1997). What's So Special About Policy Networks? - An Exploration of the Concept and Its Usefulness in Studying European Governance. *European Integration online Papers, 1*(16).

Bowen, S., & Zwi, A. B. (2005). Pathways to "evidence-informed" policy and practice: a framework for action. *PLoS Med, 2*(7), e166. doi:10.1371/journal.pmed.0020166

Burris, H., Parkhurst, J., Adu-Sarkodie, Y., & Mayaud, P. (2011). Getting research into policy - Herpes simplex virus type-2 (HSV-2) treatment and HIV infection: international guidelines formulation and the case of Ghana. *Health Res Policy Syst, 9 Suppl 1*, S5. doi:10.1186/1478-4505-9-S1-S5

Caplan, N. (1979). The two communities theory and knowledge utilization. *American Behavioral Scientist, 22*(3), 459-470.

Chew, S., Armstrong, N., & Martin, G. (2013). Instituionalising knowledge brokering as a sustainable knowledge translation solution in health care. *Evidence & Policy: A Journal of Research, Debate and Practice, 9*(3), 335-351.

Comolet, T. M., Rakotomalala, R., & Rajaonarioa, H. (1998). Factors determining compliance with tuberculosis treatment in an urban environment, Tamatave, Madagascar. *Int J Tuberc Lung Dis, 2*(11), 891-897.

Cordero, C., Delino, R., Jeyaseelan, L., Lansang, M. A., Lozano, J. M., Kumar, S., . . . Tugwell, P. (2008). Funding agencies in low- and middle-income countries: support for knowledge translation. *Bull World Health Organ, 86*(7), 524-534.

Court, J. (2006). *Bridging research and policy on HIV/AIDS in developng countries* London, UK: Overseas Development Institute.

Crewe, E., & Young, J. (2002). *Bridging Research and Policy: Context, Evidence and Links*. London, UK: Overseas Development Institute.

Crichton, J., & Theobald, S. (2011). Strategies and tensions in communicating research on sexual and reproductive health, HIV and AIDS: a qualitative study of the experiences

of researchers and communications staff. *Health Res Policy Syst, 9 Suppl 1*, S4. doi:10.1186/1478-4505-9-S1-S4

Dagenais, C., Laurendeau, M., & Briand-Lamarche, M. (2015). Knowledge brokering in public health: a critical analysis of the results of a qualitative evaluation. *Evaluation and Program Planning, 53*, 10-17.

Davies, H., Nutley, S., & Smith, P. (Eds.). (2000). *What works? Evidence-based policy and practice in public services.* . Bristol, UK: The Policy Press.

de Goede, J., Putters, K., & van Oers, H. (2012). Utilization of epidemiological research for the development of local public health policy in The Netherlands: a case study approach. *Soc Sci Med, 74*(5), 707-714. doi:10.1016/j.socscimed.2011.11.014

Finance Department of Henan Province. *The World Bank TB control project in China: review of achievement in Zhengzhou*. http://www.mof.gov.cn/zhuantihuigu/cw30/ZWC/201009/t20100903_337308.html.

Fischer, K., & Plehwe, D. (2017). Neoliberal think tank networks in Latin America and Europe: Strategic replication and cross-national organizing *Think Tanks and Global Politics* (pp. 159-186): Springer.

Handlin, S. (2015). NGOs, International Donors, and the Postmaterial Disjuncture in Latin America. *Journal of Politics in Latin America, 7*(2), 43-70.

Hanney, S. R., Gonzalez-Block, M. A., Buxton, M. J., & Kogan, M. (2003). The utilisation of health research in policy-making: concepts, examples and methods of assessment. *Health Res Policy Syst, 1*(1), 2.

Hawkins, B., & Parkhursk, J. (2016). The 'good governance' of evidence in health policy. *Evidence & Policy: A Journal of Research, Debate and Practice, 12*, 575-592.

He, A. J. (2018). Manoeuvring within a fragmented bureaucracy: Policy entrepreneurship in China's local healthcare reform. *The China Quarterly, 236*, 1088-1110.

Hutchinson, E., Parkhurst, J., Phiri, S., Gibb, D. M., Chishinga, N., Droti, B., & Hoskins, S. (2011). National policy development for cotrimoxazole prophylaxis in Malawi, Uganda and Zambia: the relationship between Context, Evidence and Links. *Health Res Policy Syst, 9 Suppl 1*, S6. doi:10.1186/1478-4505-9-S1-S6

Innvaer, S., Vist, G., Trommald, M., & Oxman, A. (2002). Health policy-makers' perceptions of their use of evidence: a systematic review. *J Health Serv Res Policy, 7*(4), 239-244. doi:10.1258/135581902320432778

Johansson, E., & Winkvist, A. (2002). Trust and transparency in human encounters in tuberculosis control: lessons learned from Vietnam. *Qual Health Res, 12*(4), 473-491. doi:10.1177/104973202129120025

Khan, M. S., Meghani, A., Liverani, M., Roychowdhury, I., & Parkhurst, J. (2018). How do external donors influence national health policy processes? Experiences of domestic policy actors in Cambodia and Pakistan. *Health Policy Plan, 33*(2), 215-223. doi:10.1093/heapol/czx145

Kim, C., Wilcher, R., Petruney, T., Krueger, K., Wynne, L., & Zan, T. (2018). A research utilisation framework for informing global health and development policies and programmes. *Health Research Policy and Systems, 16*(1), 9.

Kirkpatrick, D. (2006). *Evaluating Training Programs: The Four Levels (3rd Edition)*. San Francisco, LA, United States: Berrett-Koehler Publishers.

Knight, C., & Lyall, C. (2013). Knowledge brokers the role of intermediaries in producing research impact. *Evidence & Policy: A Journal of Research, Debate and Practice, 9*(3), 309-316.

Kong, P., Zhang, B., Wang, X., & Jiang, S. (2011). AchievementsandchalengesofWorldBankLoan/DFID grantasistantChinatuberculosis controlproject. *Chinese Journal of Health Policy, 4*(1), 61-65.

Kornreich, Y., Vertinsky, I., & Potter, P. B. (2012). Consultation and deliberation in China: the making of China's health-care reform. *The China Journal*(68), 176-203.

Korolev, A. (2014). Deliberative democracy nationwide?—Evaluating deliberativeness of healthcare reform in China. *Journal of Chinese Political Science, 19*(2), 151-172.

Lavis, J., Davies, H., Oxman, A., Denis, J. L., Golden-Biddle, K., & Ferlie, E. (2005). Towards systematic reviews that inform health care management and policy-making. *J Health Serv Res Policy, 10 Suppl 1*, 35-48. doi:10.1258/1355819054308549

Li, Y., Wu, Q., Xu, L., Legge, D., Hao, Y., Gao, L., . . . Wan, G. (2012). Factors affecting catastrophic health expenditure and impoverishment from medical expenses in China: policy implications of universal health insurance. *Bulletin of the World Health Organization, 90*, 664-671.

Lightowler, C., & Knight, C. (2013). Sustaining knowledge exchange and research impact in the social sciences and humanities: investing in knowledge broker roles in UK universities. *Evidence & Policy: A Journal of Research, Debate and Practice, 9*(3), 317-334.

Lin, V., & Gibson, B. (2003). *Evidence-based Health Policy: Problems and Possibilities*. Melbourne, Australia: Oxford University Press.

Liu, D., Yuan, C., Wang, H., Liu, Y., & Zhou, X. (2007). An analysis of factors for research use in making health policies. *Science and Technology Management Research (Chinese), 12*, 71-78.

Liu, Y., & Rao, K. (2006). Providing health insurance in rural China: from research to policy. *Journal of Health Politics, Policy and Law, 31*(1), 71-92.

Long, Q., Smith, H., Zhang, T., Tang, S., & Garner, P. (2011). Patient medical costs for tuberculosis treatment and impact on adherence in China: a systematic review. *BMC Public Health, 11*(1), 393.

Ma, J., & Lin, M. (2012). Policymaking in China: A Review of Chinese Scholarship. *China Review, 12*(1), 95-121.

Mc Sween-Cadieux, E., Dagenais, C., Somé, D. T., & Ridde, V. (2019). A health knowledge brokering intervention in a district of Burkina Faso: A qualitative retrospective implementation analysis. *PloS one, 14*(7).

Orem, J. N., Mafigiri, D. K., Marchal, B., Ssengooba, F., Macq, J., & Criel, B. (2012). Research, evidence and policymaking: the perspectives of policy actors on improving uptake of evidence in health policy development and implementation in Uganda. *BMC Public Health, 12*(1), 109.

Pérez-Escamilla, R., Lutter, C., Rabadan-Diehl, C., Rubinstein, A., Calvillo, A., & Corvalán, C. Prevention of childhood obesity and food policies in Latin America: from research to practice. Obs Rev.[Internet]. 2017 Jul;[cited Jul 25, 2017]; 18 (Suppl. 2): 28-38.

Poot, C. C., van der Kleij, R. M., Brakema, E. A., Vermond, D., Williams, S., Cragg, L., . . . Chavannes, N. H. (2018). From research to evidence-informed decision making: a systematic approach. *J Public Health (Oxf), 40*(suppl_1), i3-i12. doi:10.1093/pubmed/fdx153

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., . . . Jinks, C. (2018). Saturation in qualitative research: exploring its conceptualization and operationalization. *Qual Quan, 52*, 1893-1907.

751 Shannon, M. (2003). Mechanisms for coordination. In Y. Dubé & Schmithüsen (Eds.), *Cross-*
752 *sectoral policy impacts between forestry and other sectors*. Rome: Food and
753 Agriculture organization of the United Nations.
754 Sorian, R., & Baugh, T. (2002). Power Of Information: Closing The Gap Between Research
755 And Policy. *Health Aff, 21*(2), 264-273.
756 Sriram, V., Topp, S., Schaaf, M., Mishra, A., Flores, W., Rajasulochana, S., & Scott, K. (2018).
757 10 best resources on power in health policy and systems in low- and middle-income
758 countries. *Health Policy Plan, 33*(4), 611-621.
759 Stake, R. E. (1995). *The art of case study research*: Sage.
760 Start, D., & Holvland, I. (2004). *Tools for Policy Impact: a handbook for researchers*. London:
761 Overseas Development Institute.
762 State Council of China. (2011). *The National Plan for TB Prevention and Control 2011-2015*.
763 Beijing, China.
764 Syed, S. B., Hyder, A. A., Bloom, G., Sundaram, S., Bhuiya, A., Zhenzhong, Z., . . . Future
765 Health Systems: Innovation for, E. (2008). Exploring evidence-policy linkages in
766 health research plans: a case study from six countries. *Health Res Policy Syst, 6*, 4.
767 doi:10.1186/1478-4505-6-4
768 Tang, S., Brixi, H., & Bekedam, H. (2014). Advancing universal coverage of healthcare in
769 China: translating political will into policy and practice. *The International journal of*
770 *health planning and management, 29*(2), 160-174.
771 Tran, N., Langlois, E. V., Reveiz, L., Varallyay, I., Elias, V., Mancuso, A., . . . Ghaffar, A. (2017).
772 Embedding research to improve program implementation in Latin America and the
773 Caribbean. *Revista Panamericana de Salud Pública, 41*, e75.
774 Trostle, J., Bronfman, M., & Langer, A. (1999). How do researchers influence decision-
775 makers? Case studies of Mexican policies. *Health Policy Plan, 14*(2), 103-114.
776 Tulloch, O., Mayaud, P., Adu-Sarkodie, Y., Opoku, B. K., Lithur, N. O., Sickle, E., . . . Theobald,
777 S. (2011). Using research to influence sexual and reproductive health practice and
778 implementation in Sub-Saharan Africa: a case-study analysis. *Health Res Policy Syst,*
779 *9 Suppl 1*, S10. doi:10.1186/1478-4505-9-S1-S10
780 Uneke, C. J., Ezeoha, A. E., Uro-Chukwu, H., Ezeonu, C. T., Ogbu, O., Onwe, F., & Edoga, C.
781 (2015). Enhancing the Capacity of Policy-Makers to Develop Evidence-Informed
782 Policy Brief on Infectious Diseases of Poverty in Nigeria. *Int J Health Policy Manag,*
783 *4*(9), 599-610. doi:10.15171/ijhpm.2015.100
784 Walt, G., Shiffman, J., Schneider, H., Murray, S. F., Brugha, R., & Gilson, L. (2008). 'Doing'
785 health policy analysis: methodological and conceptual reflections and challenges.
786 *Health Policy Plan, 23*(5), 308-317. doi:10.1093/heapol/czn024
787 Wang, J., He, P., Zhu, X., & Zhu, K. (2011). Analysis on Determinants of Health Policy
788 Research Utilizat ion:Based on the Health
789 Policy Researcher Survey. *Chinese Journal of Social Medicine, 28*(2), 81-83.
790 Weiss, C. (1979). The many meanings of research utilization. *Public Adm Rev, 39*, 426-431.
791 WHO. (2017). *Global tuberculosis report 2017*. Retrieved from Geneva, Switzerland
792 http://www.who.int/tb/publications/global_report/en/ [accessed 28 March 2018]:
793 Wingens, M. (1990). Toward a general utilization theory. *Knowledge: Creation, Diffusion,*
794 *Utilization, 12*(1), 27-42.
795 Zou, G., Wei, X., Walley, J. D., Yin, J., & Sun, Q. (2012). Factors influencing integration of TB
796 services in general hospitals in two regions of China: a qualitative study. *BMC Health*
797 *Services Research, 12*(1), 21.

798