

China's public health-care system: facing the challenges

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Abstract The severe acute respiratory syndrome (SARS) crisis in China revealed not only the failures of the Chinese health-care system but also some fundamental structural deficiencies. A decentralized and fragmented health system, such as the one found in China, is not well-suited to making a rapid and coordinated response to public health emergencies. The commercial orientation of the health sector on the supply-side and lack of health insurance coverage on the demand-side further exacerbate the problems of the under-provision of public services, such as health surveillance and preventive care. For the past 25 years, the Chinese Government has kept economic development at the top of the policy agenda at the expense of public health, especially in terms of access to health care for the 800 million people living in rural areas. A significant increase in government investment in the public health infrastructure, though long overdue, is not sufficient to solve the problems of the health-care system. China needs to reorganize its public health system by strengthening both the vertical and horizontal connections between its various public health organizations. China's recent policy of establishing a matching-fund financed rural health insurance system presents an exciting opportunity to improve people's access to health care.

Keywords Delivery of health care/organization and administration/economics; Disease outbreaks/prevention and control; Disease notification; Economics; Communicable disease control/organization and administration; Health services accessibility/economics; Health infrastructure/economics; Insurance coverage; Rural health services/organization and administration; Severe acute respiratory syndrome/prevention and control; China (source: MeSH, NLM).

Mots clés Délivrance soins/organisation et administration/économie; Epidémie/prévention et contrôle; Notification maladie; Économie; Lutte contre maladie contagieuse/prévention et contrôle; Accessibilité service santé/économie; Infrastructure sanitaire/économie; Couverture assurance; Service santé milieu rural/organisation et administration; Syndrome respiratoire aigu sévère/prévention et contrôle; Chine (source: MeSH, INSERM).

Palabras clave Prestación de atención de salud/organización y administración/economía; Brotes de enfermedades/prevenición y control; Notificación de enfermedad; Economía; Control de enfermedades transmisibles/ salud/organización y administración; Accesibilidad a los servicios de salud/economía; Infraestructura sanitaria/economía; Cobertura del seguro; Servicios rurales de salud, organización y administración; Síndrome respiratorio agudo grave/prevenición y control; China (fuente: DeCS, BIREME).

الكلمات المفتاحية: تنظيم إيتاء الرعاية الصحية، اقتصاديات إيتاء الرعاية الصحية؛ الوقاية من فاشيات الأمراض ومكافحتها؛ التبليغ عن الأمراض؛ الاقتصاد؛ مكافحة الأمراض السارية؛ تنظيم مكافحة الأمراض السارية؛ تيسر الحصول على الخدمات الصحية؛ اقتصاديات الحصول على الخدمات الصحية؛ التغطية بالتأمين الصحي؛ تنظيم خدمات الرعاية الصحية في الريف؛ الوقاية من متلازمة الالتهاب التنفسي الحاد الوخيم ومكافحتها؛ الصين (المصدر: رؤوس الموضوعات الطبية - إقليم شرق المتوسط).

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Voir page 537 le résumé en français. En la página 537 figura un resumen en español.

يمكن الاطلاع على الملخص بالعربية في صفحة 537.

Introduction

As "the first new public health epidemic of the twenty-first century" (1) severe acute respiratory syndrome (SARS) has caused unprecedented worldwide interest in understanding the causes of, consequences of, and effective mechanisms for dealing with epidemics. While it is necessary to learn about the biological, clinical, and epidemiological characteristics of the disease, it is also important to understand that any public health crisis takes place in the context of the local health-care system (2). How a health system is organized and financed has a critical impact on its ability to detect and control epidemics. A public health system

that functions well should be capable of detecting and responding to epidemics early. In China, the SARS epidemic exposed broad structural deficiencies in the public health system.

During the second half of the twentieth century, China went through two distinct development phases: the era of the egalitarian society (1950s–1970s) and the era of economic liberalization (1980s–1990s). The first era was characterized by outstanding achievements in improving the population's health despite low income levels (3, 4), while the second era produced one of the world's fastest growing economies. During the era of economic liberalization, however, China's health development lagged behind its economic growth (5). From 1949 to the mid-

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1980s, China's health policies emphasized prevention and public health, wide entitlement and access to medical care, and the use of minimally trained health personnel (village medical practitioners or "barefoot doctors") to provide basic health services. This strategy helped China reduce infant mortality from about 250 per 1000 live births in 1952 to 34 per 1000 in 1985 and increase life expectancy from about 35 years to 68 years during the same period (6). However, improvements in health stagnated during the period of economic reforms, and inequalities in health and access to health care have increased (7–10).

In *The world health report 2000 – Health systems: improving performance*, the performance of China's health-care system was rated poorly when compared with other countries (11). For example, on the dimension of fairness of financial contribution, China ranked 188th, almost at the bottom of the list. Even though reforms to the health system had started before the SARS epidemic, major deficiencies, such as inequalities of access and inefficiency, persisted (12, 13). Many of the challenges facing China's health system are related to two larger trends of socioeconomic reform and development: decentralization and the opening of the system to market forces (marketization). Decentralization and marketization are not necessarily bad for a health-care system. The key issue is how to utilize the opportunities generated by the process and address the problems associated with it. This paper examines the important problems existing in China's health-care system and discusses strategies to solve these problems.

Decentralization

To rectify some of the irrationalities and inefficiencies that developed under the highly centralized planning system, China decentralized its fiscal system in the mid-1980s (14). In 1985, the central government's revenue as a percentage of gross domestic product (GDP) was 8%. But in 1995, it fell to 5% (15). Investment and spending decisions have been decentralized to both the provinces and individually owned enterprises. Within provinces, social spending, including health spending, is largely decentralized to county and township governments. As an immediate consequence of this reform, vertical lines of communication and the control of the health system have been weakened.

Weak communication and control

As shown in Fig. 1, China's public health system comprises Epidemic Prevention Stations (EPSs) at different administrative levels: province, city, and county. As well as conducting health surveillance at its own level, including collecting information on infectious diseases from hospitals in the same level of government, each lower-level EPS is also supposed to report to and receive technical guidance from the corresponding upper-level EPS. In reality, however, the influence and control of the upper-level EPSs are very weak (16). All EPSs primarily report to the government health bureau at the same administrative level rather than to the upper-level EPS, which in turn reports to the Ministry of Health. The Ministry of Health's annual statistical report indicates that there are provinces and cities from which no data were reported. With limited financial resources and few national administrative mandates, the role of the Ministry of Health in initiating and sustaining public health programmes has diminished. The establishment of the national Centre for Disease Prevention and Control (China CDC) was approved by the State Council in 2002 (shortly before the SARS epidemic), and much of the infrastructure for a nationally integrated public health surveillance and response system has yet to be established.

To combat SARS, China established a national command and control centre under the leadership of Vice-Premier Madame Wu Yi. This centralized mechanism was effective in coordinating communications and emergency responses to SARS. But the critical question is whether this kind of crisis-management mechanism can be sustained in the absence of a crisis. To strengthen vertical communications and control mechanisms, one strategy might be to nationalize part (if not all) of the public health system (e.g., the system of public health surveillance). This would mean turning regional and local EPSs (or parts of the EPSs) into branch offices of the China CDC by giving the China CDC the necessary financial and organizational levers. Similar successful reform measures have been adopted in China's taxation system (17). This would also further strengthen the technical capability of the China CDC to supervise and guide public health work at regional and local levels, giving these officials a strong incentive to report to the upper levels of the programme so that effective solutions to local problems can be worked out with the guidance of the China CDC.

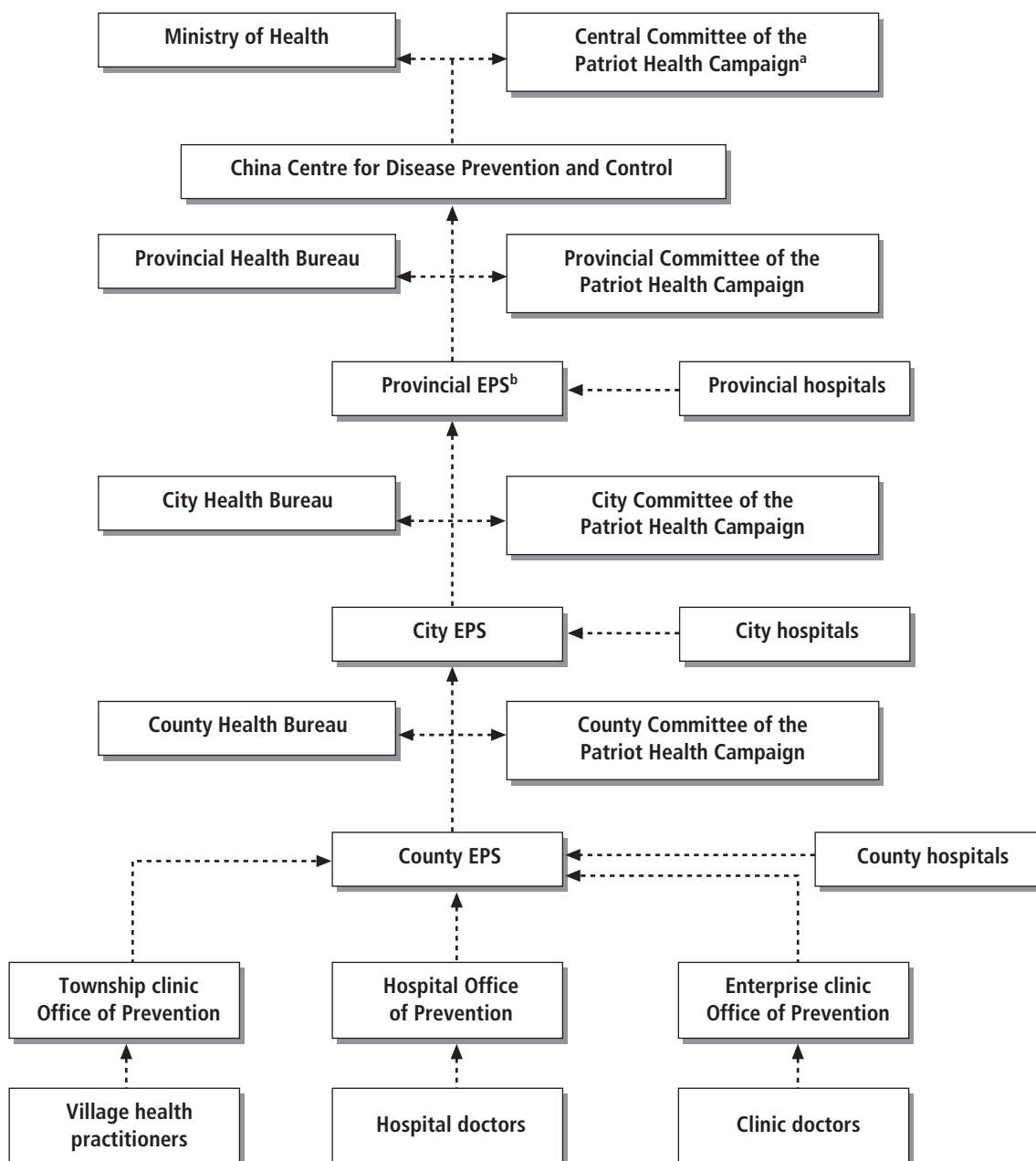
Fragmentation of the health system

While all EPSs are run by local governments, clinics and hospitals are owned and operated by a diverse set of institutions, including state-owned enterprises, military establishments, private investors, and local cooperatives. Other than legislation on "reportable infectious diseases," which is not updated regularly (so cases of many new diseases, such as SARS, do not require reporting), there are inadequate regulations regarding the public health responsibilities of these organizations and also a lack of mechanisms for effectively enforcing regulations. At a press conference during the SARS crisis, Gao Qiang, China's Executive Vice-Minister of Health, explained why initially there had been an under-reporting of SARS cases in Beijing: "There are 175 tertiary hospitals in Beijing: 131 are run by the city, district and county governments; 14 are run by the Ministry of Health and Ministry of Education; 16 belong to the military; 14 are run by the enterprises. These hospitals do not share information and are not under the same administration. SARS patients are admitted to more than 70 hospitals. The city government of Beijing did not have comprehensive and accurate statistics" (18).

These problems affect not only horizontal communications and collaborations in public health care within a province or city but also the interactions between provinces and cities. Ever since China's decentralization of the fiscal system in the late 1980s, competition for investment and a desire for marketplace dominance among provinces and cities have been intensified which may make it difficult for local governments to share information and work in partnership in areas such as public health (18).

The bureaucratic challenges of detecting and controlling communicable diseases such as SARS and HIV/AIDS are compounded because many provincial authorities see them as politically sensitive issues (19). These authorities believe that releasing sensitive health statistics may spark civil unrest or have a negative impact on foreign investment or tourism, all of which reduce a local official's prospects for promotion within the party or civil service. Overcoming these obstacles will require intensified and innovative "carrot and stick" policies that implement new laws and incentive schemes so that the negative effects of regional action (or inaction) can be controlled and positive actions can be encouraged and supported. Recently, China updated its Law

Fig. 1. Lines of reporting and supervision in China's public health system



^a The Patriot Health Campaign is a government programme aimed at organizing health education campaigns to respond to important public health problems.

^b EPS = Epidemic prevention stations.

of Controlling Infectious Diseases. This is a move in the right direction. Certainly, more can be done to reward (rather than punish) truthful reporting by local governments.

Variation in capacities and performance

Without appropriate mechanisms to transfer and equalize payments, decentralization naturally leads to increasing variations in investment by provinces, cities, towns and other entities in public health capacities, as well as to variations in the performance of health systems across China (7–10). So while some regions may be able to detect and control major epidemics in their area (e.g., Guangzhou and Beijing, which are among the

best developed regions in China), others may simply be unprepared for major public health challenges.

Particularly disquieting is the lack of an adequately functioning public health system in China's vast rural areas. Even though each county has an EPS, public health work at the township and village level has been weak due to under-funding and a lack of supervision and coordination among rural health-care providers (20). The SARS virus and many other viruses are known to have, or believed to have, animal hosts. In rural regions in China, agriculture is a critical part of the economy and close human–animal contact is inevitable. Since many infectious diseases, such as bird flu, have animal hosts, strengthening rural

public health systems is essential in order to detect and control outbreaks. There must also be closer collaboration between the health and agricultural sectors in public health surveillance and control.

Marketization

Closely related to the trend of decentralization is the reduction in the government's role in health care and the increasing role of market forces (21). To be sure, marketization has brought about some positive progress in the health sector, notably the increasing supply of modern health facilities and the wide variety of medicine that is now available. China's total supply of health-care professionals in 1985 was 3.4 million, and the total number of hospital beds was 2.4 million. By 2001, the number of health professionals had increased to 5.5 million and the number of hospital beds to 3.2 million (22). However, most of the improved availability of health services tends to benefit the people who can afford to pay. As the financing of health care in China has become increasingly privatized, inequalities in health care and in health status have increased (7, 8). Moreover, health-care providers have become less interested in public health work than medical treatment because there is little or no remuneration for preventive services, and there is increasing pressure for providers to generate revenue.

Weakened government role

As shown in Table 1, China's total health spending as a percentage of GDP increased from 4.11% in 1991 to 4.82% in 2000, but all government spending on health as a share of total health spending decreased from 22% in 1991 to 14% in 2000 (22). In contrast, individual out-of-pocket spending as a share of total health spending increased from 38% to 60% during the same period. Access to health care in China is now ruled by the ability to pay. Furthermore, the share of the government's spending on public health has also decreased (from 75% in 1991 to 70% in 2000). This relative reduction in government spending on health has taken place at a time when China's public health problems are becoming more complicated due to factors such as industrial pollution and the increasing mobility of society as a result of the easing of restrictions on internal travel (16). The government's disinvestment in health has undermined the provision of health surveillance services and prevention services (23).

In the aftermath of SARS, the Chinese Government has significantly increased investment in public health. While this is welcome, increasing the overall amount of money invested in public health infrastructure is not sufficient to solve the health system's problems.

Private financing and access problems

Despite rising medical costs, the number of people actually covered by insurance decreased in the 1990s (Table 2). According to two National Health Services surveys conducted by the Ministry of Health, the percentage of urban and rural populations with any health insurance fell from 53% to 42% in 1993 and from 12% to 9% in 1998 (23). Using the 1998 National Health Services Survey data, the impact of medical expenditure on the levels of poverty in different rural regions was estimated. The incidence of poverty for the whole rural sample is 7.22%. Out-of-pocket spending on health care has thus raised the figure by more than 3 percentage points and raised the number of rural households living below the poverty line by 44.3% (23).

Due to the high costs of medical care and the lack of insurance, the total health-care utilization rate in China has been falling (24). For example, in 1985 the bed occupancy rate of township health centres was 46.0% and that of county hospitals was 82.7%. By 2000, these rates had dropped to 33.1% for township health centres and to 60.8% for county hospitals. In regions where there is a high proportion of people living in poverty the admission rate of people without insurance is 35 per 1000, which is much lower than that for people with insurance (251 per 1000). Furthermore, poorer households tend to use fewer medical resources. On average 45% of the discharges from medical care in rural China are initiated by patients against medical advice. Close to 80% of these discharges occurred because patients could not afford to stay longer in hospital (23, 24). If people do not seek professional care when they are ill, their conditions cannot be properly diagnosed and treated, and this may cause further deterioration in their health. From a public health point of view, this is particularly important in the case of infectious diseases, since the likelihood of infections spreading and leading to an epidemic outbreak — as in the case of SARS — is increased.

To increase health-care utilization, the financial barriers to access must be reduced. China has recently announced new health insurance policies for people living in rural areas (25).

Table 1. Health care spending in China (23)

Expenditure	Year		
	1991	1995	2000
% of GDP ^a spent on health	4.11	3.86	4.82
% of total expenditure on health funded by the government	22	17	14
% of total expenditure on health funded by individuals	38	50	60
% of government health spending allocated to public health	75	72	70

^a GDP = gross domestic product.

Table 2. Cost of medical care and percentage of population with health insurance (23)

	Year		Change (%)
	1993	1998	
Cost of medical care^a			
<i>Per visit</i>			
Urban	32	118	268
Rural	16	44	175
<i>Per admission</i>			
Urban	1703	4037	137
Rural	613	1532	149
Insurance coverage^b			
Urban	53	42	-22
Rural	12	9	-25

^a Costs are given in yuan. 1 yuan = US\$ 0.12.

^b Coverage is given as a percentage.

However, this government-subsidized insurance is intended only to help cover catastrophic medical expenses. It remains to be seen how primary care and preventive services will be affected by the financing reforms.

Commercialization of the health sector

In the mid-1980s, the Chinese Government decided to tighten budgets for public hospitals and other health-care organizations (25, 26). With the exception of basic salaries for a designated number of personnel, which continued to be subsidized by the government, public sector health-care providers were expected to generate revenues to cover the difference between their total costs and the government's budget allocation. Although the prices of medical services relative to costs have been kept low by the government's policy, health-care providers have been allowed a 15–20% mark-up on the wholesale price of drugs. Thus, under the new financing and medical pricing structure, public health-care providers have strong financial incentives to prescribe and sell more drugs.

Even the EPSs, which are supposed to provide public health services, have paid more attention to revenue-generating activities than to preventive services. Fig. 2 shows the changing sources of income for the EPSs in China. In 1985, government budget allocations and grants accounted for close to 80% of their total income. In 1997, the government's allocation and grants as a share of total EPS income decreased to less than 40% (24). The EPS generated the majority of their income from fee-charging activities, including annual physical examinations for urban enterprise workers and middle school students.

The problems associated with the commercialization of the health sector are most pronounced in China's rural areas. Before the economic system was reformed, the rural three-tier system (village health station, township health centre, and county hospital) was an integrated system with a formal bottom-up referral process for patients. Regular technical supervision was provided to the lower-level health facilities by the upper-level facilities. In the two decades after reform, which were accompanied by the collapse of the rural Cooperative Medical System, China's rural health-care delivery system has become fragmented, with different health facilities competing for revenues from patients. Village health stations have largely been privatized. Although the national government has introduced a medical licensing system, whereby village medical practitioners have to be certified

as "rural doctors"; these practitioners receive little supervision and professional training. The 1998 survey found that only a small proportion of the village health stations (5%) were funded and supervised by the township health centres: most of the village health stations are independent operations, unconnected to other levels of care, regardless of whether they are owned by private practitioners (25%) or collectively owned by the villages (24). This is not a trivial matter: for many patients the village health practitioner is the first point of contact (and in many cases the only accessible contact) with the rural medical system. According to the 1998 National Health Services Survey, 53% of the total number of outpatient visits are handled by village health practitioners despite the fact that these rural doctors have minimal training. If these practitioners are not given further training and supervision, villagers may suffer from unsafe medical practices. A joint study between the United Nations Children's Fund (UNICEF) and the Ministry of Health found that the practices of unsafe prescribing and giving unnecessary prescriptions is widespread among China's village health practitioners. In 1998, 20–36% of the prescriptions given by village practitioners unnecessarily contained corticosteroids. The percentage of children receiving intramuscular injections for the common cold was as high as 46–64%. Most of the village health practitioners (62–85%) did not keep records on patients (unpublished data presented at the International Seminar on Rural Health Care Financing, Beijing, 11–13 December 2000). Both the technical and ethical standards of China's health professionals need to be raised.

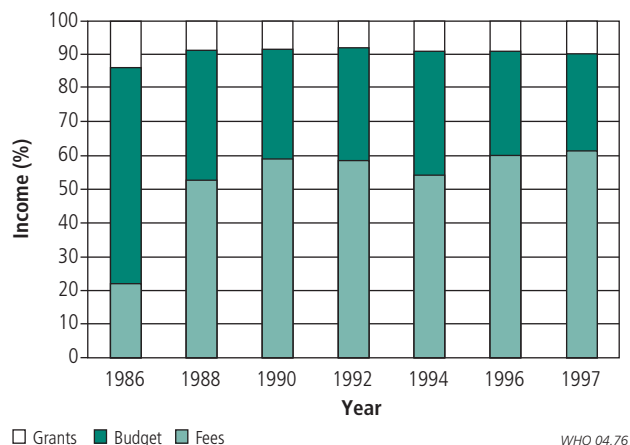
Discussion

"Wei Ji" is the Chinese word for crisis, with the first character meaning "danger" and the second meaning "opportunity". The SARS crisis exposed some important problems with China's health system. These problems are associated with the country's overall trends towards decentralization and marketization, though they are not directly caused by these trends. In the wake of the government's move towards a market-driven economy, the role of the government in financing, organizing, and delivering public health services has been weakened, leading to an underfunded and fragmented public health-care system. As a result, China lacks the capability to detect, communicate responsibly, and control effectively major epidemics, as evidenced by the early stages of the SARS epidemic. The SARS crisis served as a wake-up call with regard to the importance of public health in the country's socioeconomic development and the need for strengthening the government's role in public health. Now, however, public health has moved to the top of China's public policy agenda, and the level of government investment in public health infrastructure is unprecedented (27). However, it will take more than money to solve the problems of China's health system.

Roberts et al. proposed a framework for thinking about major areas of intervention for reforming a health system in terms of "control knobs" (28). Two of the control knobs — organization and financing — are particularly relevant to China.

First, China needs to reorganize its public health system. In addition to strengthening the technical capacity of the China CDC, a clear line of communication and control between the central CDC and local EPSs needs to be established. One organizational strategy is vertical integration, namely turning regional and local EPSs (or part of the EPS) into branch offices of the China CDC, taking a cue from China's successful tax collection

Fig. 2. Income sources for China's Epidemic Prevention Stations (24)



system. Moreover, updating and developing new public health laws would help specify the roles and responsibilities of different stakeholders.

Second, China also needs to pay adequate attention to the demand-side of the public health system, particularly to reducing the financial barriers to public health services. Most of the 800 million Chinese who live in rural areas are uninsured, and they have to pay for health-care services, including preventive services, out of their own pocket. China has announced new health insurance policies for people living in rural areas (25). The new policy stipulates that for the 400 million rural residents

who live in China's midland and western regions, the central government will provide 10 yuan (US\$ 1.25) premium subsidies per person. These are to be matched by a contribution of at least 10 yuan from provincial and lower levels of government as well as by at least 10 yuan from each family. However, the government-subsidized rural health insurance is intended only to help cover catastrophic medical expenses. It remains to be seen how primary care and preventive services will be affected by these and other financing reforms. ■

Conflicts of interest: none declared.

Résumé

Le système de santé publique en Chine : relever les défis

La crise du syndrome respiratoire aigu sévère (SRAS) survenue en Chine a révélé non seulement les failles du système chinois de santé publique mais aussi certaines insuffisances structurelles majeures. Un système de santé décentralisé et fragmenté tel qu'on en trouve en Chine est peu adapté à l'élaboration d'une réponse rapide et coordonnée face à une situation d'urgence sanitaire. L'orientation commerciale du secteur de la santé, du côté de l'offre de soins, et l'absence de couverture d'assurance-maladie, du côté de la demande, aggravent encore le problème de l'insuffisance des services publics, par exemple dans le domaine de la surveillance sanitaire et des soins de santé préventifs. Ces 25 dernières années, le Gouvernement chinois a donné la priorité au développement économique au détriment de la santé publique,

notamment en ce qui concerne l'accès aux soins de santé pour les 800 millions de personnes qui vivent dans les zones rurales. Une augmentation notable de l'investissement des pouvoirs publics dans l'infrastructure de santé publique, bien qu'attendue depuis longtemps, ne suffit pas à résoudre les problèmes du système de santé. La Chine a besoin de réorganiser son système de santé publique en renforçant les liens aussi bien verticaux qu'horizontaux entre ses différentes agences sanitaires. La politique récente qui consiste à établir dans les zones rurales un système d'assurance-maladie financé par des subventions compensatoires offre une occasion intéressante d'améliorer l'accès de la population aux soins de santé.

Resumen

El sistema público de atención sanitaria en China: afrontar los desafíos

La crisis que supuso el síndrome respiratorio agudo severo (SRAS) en China reveló no sólo los fallos del sistema de atención de salud de ese país sino también algunas deficiencias estructurales fundamentales. Un sistema sanitario descentralizado y fragmentado, como el que hay en China, no es el adecuado para articular una respuesta rápida y coordinada a las emergencias de salud pública. La orientación comercial del sector sanitario por el lado de la oferta, unida a la falta de cobertura del seguro de enfermedad por el lado de la demanda, agravan aún más los problemas de escasez de algunos servicios públicos, como la vigilancia sanitaria y la atención preventiva. Durante los últimos 25 años el Gobierno de China ha considerado el desarrollo económico

como la máxima prioridad de su agenda, a expensas de la salud pública, sobre todo en lo que atañe al acceso a la atención sanitaria por parte de los 800 millones de personas que viven en zonas rurales. Un aumento importante de la inversión del gobierno en la infraestructura de salud pública, aunque esperado desde hace tiempo, resulta insuficiente para resolver los problemas del sistema asistencial. China necesita reorganizar su sistema de salud pública fortaleciendo los vínculos tanto verticales como horizontales entre sus diversas organizaciones de salud pública. La reciente política de China de establecer un sistema de seguro médico rural con fondos de contrapartida brinda una interesante oportunidad para mejorar el acceso de la población a la atención de salud.

ملخص

نظام الرعاية الصحية العمومية في الصين: مواجهة التحديات

حساب الصحة العمومية، ولاسيما في ما يتعلق بتيسير حصول سكان المناطق الريفية، البالغ عددهم ٨٠٠ مليون نسمة، على الرعاية الصحية. وبالرغم من التزايد الملموس في الاستثمار الحكومي في البنية الأساسية للصحة العمومية، والذي تأخر كثيراً، إلا أنه لا يكفي لحل مشكلات نظام الرعاية الصحية. إن الصين بحاجة إلى إعادة تنظيم نظامها للرعاية الصحية، عن طريق تقوية الروابط الأفقية والعمودية بين مختلف منظمات رعاية الصحة العمومية هناك. وتعتبر السياسة الصينية الحديثة، التي تنطوي على إنشاء نظام مواز للتأمين الصحي في المناطق الريفية، فرصة رائعة لتحسين حصول السكان على الرعاية الصحية.

ملخص: كشفت أزمة متلازمة الالتهاب التنفسي الحاد الوخيم في الصين عن فشل نظام الرعاية الصحية الصيني وكذلك عن بعض أوجه القصور في البنية الصحية الأساسية. فأى نظام صحي يعاني من اللامركزية والتشتت، كالنظام القائم في الصين، غير مؤهل للاستجابة السريعة والمتناسقة للطوارئ الصحية العمومية. كما أن التوجه التجاري للقطاع الصحي من حيث العرض، ونقص التغطية بالتأمين الصحي من حيث الطلب، يفاقمان مشكلات قصور الخدمات العمومية، مثل الترصد الصحي والرعاية الوقائية. وعلى مدى الأعوام الخمسة والعشرين الماضية، وضعت الحكومة الصينية قضية التنمية الاقتصادية على رأس برنامج العمل السياسي، ولكن على

References

1. Brundtland GH. SARS – a global threat, a global response. (EU Council of Health Ministers' Meeting.) Available from: http://www.who.int/dg/speeches/2003/eucouncil_sars/en/
2. Bloom BE. Lessons from SARS. *Science* 2003;300:5620.
3. Chen CC. *Medicine in rural China: a personal account*. Berkeley (CA): University of California Press; 1989.
4. Sidel VW. The barefoot doctors of the People's Republic of China. *New England Journal of Medicine* 1972;286:1292-99.
5. World Bank. *Financing health care: issues and options for China*. Washington (DC): World Bank; 1997.
6. Huang Y, Liu Y. [Mortality data of the Chinese population]. Beijing: the Chinese Population Press; 1995. In Chinese.
7. Liu Y, Hsiao WC, Eggleston K. Equity in health and health care: the Chinese experience. *Social Science and Medicine* 1999;49:1349-56.
8. Liu Y, Rao K, Evans T, Chen, Y, Hsiao WC. China: increasing health gaps in a transitional economy. In: Evans T, Whitehead M, Ditrichson F, Wirth M, editors. *Challenging inequities in health: from ethics to action*. New York: Oxford University Press; 2001. p. 76-89.
9. Shen T, Habicht J-P, Chang Y. Effect of economic reforms on child growth in urban and rural areas of China. *New England Journal of Medicine* 1996;335:400-6.
10. Bloom G, Gu X. Health sector reform: lessons from China. *Social Science and Medicine* 1997;45:351-60.
11. World Health Organization. *The world health report 2000. Health systems: improving performance*. Geneva: World Health Organization; 2000.
12. State Council. [Guidelines for reforming the urban health and pharmaceutical sectors]. Beijing: State Council; 2000. In Chinese.
13. State Council. [Guidelines for reforming the rural healthcare system]. Beijing: State Council; 2001. In Chinese.
14. Hartland-Thunberg P. *A decade of China's economic reform: challenges for the future*. Washington (DC): Center for Strategic and International Studies; 1989.
15. State Statistics Bureau, PRC. [Social statistic information on China]. Beijing: State Statistics Bureau Press; 2000. In Chinese.
16. Hu S. [The health impact of economic development and reform]. *Chinese Health Economics* 1995;14:58-63. In Chinese.
17. Forster K. *Taxation reform in China: the proof of the pudding*. Singapore: National University of Singapore; 2001.
18. Department of Regional Development, State Development Reform Commission. Baseline study on harmonizing regional economic development. In: SDRC, editors. [Strategic studies of the 10th 5-year plan]. Beijing: China Population Press; 2000. In Chinese.
19. Congressional-Executive Commission on China. *Congressional-Executive Commission on China: annual report for 2003*. Washington (DC): US Government Printing Office; 2003. p. 46-7. (Also available from <http://www.cecc.gov/pages/annualRpt/2003annRpt.pdf>)
20. Liu Y, Hsiao WC, Liu X, Li Q, Ren M. Transformation of China's rural health care financing. *Social Science and Medicine* 1995;8:1085-93.
21. Jamison DT, Prescott N. *China: the health sector*. Washington, DC: World Bank; 1984.
22. Ministry of Health, People's Republic of China. [National health statistics]. Beijing: Ministry of Health; 2002. In Chinese.
23. Liu Y, Rao K, Hu S. *Towards establishment of a health protection system in rural China*. Beijing: Asian Development Bank; 2003.
24. Ministry of Health, People's Republic of China. [Reports on the 1998 National Health Services Survey results]. Beijing: Ministry of Health, 1999. In Chinese.
25. Yin HB. The national rural health conference was convened in Beijing. *People's Daily* 2002;29 October.
26. Liu X, Liu Y, Chen N. The Chinese experience of hospital price regulation. *Health Policy and Planning* 2000;15:157-63.
27. Ministry of Health, People's Republic of China. *Health and macroeconomics in China: country report for the 2nd World Health Organization Consultative Meeting on Macroeconomics and Health*. Geneva: World Health Organization; 2003.
28. Roberts MJ, Hsiao WC, Berman P, Reich MR. *Getting health reform right – a guide to improving performance and equity*. Oxford: Oxford University Press; 2004.