

# The impact of the government health funding on prescribing behaviors in community health institutions in China

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## Abstract

Government health funding (GHF) is a cosmopolitan problem. It is especially conspicuous in China, where drug sales become a main source of medical institutions' incomes due to limited GHF. This is well known as China's "drug maintain medical institutions (DMMIs)" system which results directly in very high use of antibiotics, injections, and corticosteroids. However, few statistical data existed in China on the association between the GHF and the prevalence of inappropriate drug prescribing, despite widespread acknowledgment of its existence.

A multistage sampling strategy was employed to select 442,100 prescriptions written between 2007 and 2011 by urban community health (CH) institutions and check the GHF in 36 key cities (districts) across China. This study examined the association between the GHF and the prevalence of inappropriate drug prescribing, which differs somewhat from previous studies.

The data suggested that from 2007 to 2011, with the increase of GHF, prescribing behaviors (PB) gradually improved on the whole although doctors still prescribed a few more drugs than the recommendations from World Health Organization (WHO). This study found that there is significant negative association between GHF and main indicators of PB (correlation coefficients more than 0.5).

The findings implied that government should further perfect the compensation mechanism to medical institutions for gradually weakening the compensation function of drug sales in medical institutions.

**Abbreviations:** CH = community health, DMMIs = drug maintain medical institutions, GHF = government health funding, PB = prescribing behaviors, WHO = World Health Organization.

**Keywords:** CH, China, GHF, PB

## Key Points

- From 2007 to 2011, with the increase of GHF, PB gradually improved on the whole although doctors still prescribed a few more drugs than the WHO's recommendations.
- There is significant negative association between GHF and main indicators of PB (correlation coefficients more than 0.5).

- Government should further perfect the compensation mechanism to medical institutions for gradually weakening the compensation function of drug sales in medical institutions.
- This study paves the way for further efforts to understand government's leading role in public health practice.

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## 1. Introduction

With the rising of the proportion of China national health expenditure in the gross national product (GNP), government's funding is difficult to maintain the medical institutions. In this background, in 1989 the Chinese Ministry of Health, Ministry of Finance, State Administration for Commodity Prices jointly provided a mandate that medical institutions implemented the autonomous funding governs and could be engaged in a variety of paid services.<sup>[1]</sup>

Since then there are 3 source of funding support for medical institutions in China: government funding, income from medical services, and drug markup. The government funding allocation depends on its fiscal capacity. Government usually pays attention to economic development while ignoring healthcare. Therefore government funding is very limited for medical institutions. For example, state funding is less than a quarter of the total cost in medical institutions across the country, and the remaining exceeding 3-quarters of the cost stems from medical institutions' income. Medical services are limited by the price of the Price Bureau. The labor value of medical personnel is underestimated.

Therefore medical institutions have to rely on drug markup to maintain the normal operation and personnel salary,<sup>[2–4]</sup> which results in an increase in household exposure to funding risk and a decline in quality of medical care.<sup>[5–7]</sup>

In 2006, 8 departments of the State Council, including National Development and Reform Commission, etc., jointly issued a regulation “the opinion of further consolidating price order in the drugs and medical service market.” This regulation confirmed that medical institutions could gain respectively 15%, 16%, and 20% of profits from sales of proprietary Chinese medicine, western medicine, and Chinese herbal medicine. Medical institutions encouraged doctors to prescribe more lucrative medicine for obtaining more profits to maintain normal operation. According to the statistics from Chinese Ministry of Health, the proportion of drug “markups” in the hospital income is averagely about 60%, and in a few small- and medium-sized hospitals even reached 70% to 80%. Drug “markups” have become the major source of revenue for healthcare providers, which is well known as drug maintain medical institutions (DMMIs) in China. It results directly in very high use of antibiotics, injections, and corticosteroids.<sup>[8–10]</sup>

China’s DMMIs rooted from limited government health funding (GHF).<sup>[11]</sup> According to data released by the Chinese Ministry of Health, in 1990, the proportion of the GHF in the total health expenses was 24.09%; but by 1998, the proportion dropped to 15.6%; it was 17% in 2003 and 29.9% in 2014.

Too little GHF is not only the foundation of DMMIs system, but also the reason of drug abuse, such as very high use of antibiotics, hormone, and injections.<sup>[12–15]</sup> However, few statistical data existed in China on the association between the GHF and the prevalence of inappropriate drug prescribing, despite widespread acknowledgment of its existence.

This study, sponsored by the Chinese Ministry of Health and intended to fill the data gap, firstly checked the association between GHF and PB by analyzing 442,100 prescriptions written by community doctors in 36 cities of China.

## 2. Study data and methods

### 2.1. Ethics statement

The study protocol was approved by the institutional review board of Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China. All participants read a statement that explained the purpose of the survey and were provided with written consent form before participating in the study.

**2.1.1. Prescribing indicators.** To design and disseminate effective strategies to improve the way in which drugs are prescribed, the WHO developed a list of rational drug use indicators, which have become widely used to assess PB in medical institutions in most countries in the world.<sup>[16–19]</sup>

Our research team employed four indicators from the WHO’s list that could be appraised using data from written prescriptions. These indicators included the average number of drugs prescribed per prescription; the percentage of prescriptions with injections prescribed; the percentage of prescriptions with antibiotics prescribed; and the percentage of prescriptions with 2 or more antibiotics prescribed.<sup>[17,18,20]</sup> In view of overwhelming concerns from health officials about inappropriate prescribing of hormones and rising medicine expense, this study incorporated 2 additional indicators: percentage of prescriptions with hormones and average cost per prescription.<sup>[21–24]</sup>

**2.1.2. Data collection.** The sampling method and sample-size calculation were determined following the methodology recommended by the WHO. First, cities across China were divided into 3 groups: developed eastern cities; least-developed western cities; and “middle” cities between the 2. The cities were further divided into city districts.<sup>[25,26]</sup> Thirty-six cities were selected using multistage sampling methods based on economic and political characteristics, city size, and the development level of community health (CH) services. Developed eastern cities may contribute more cities than other regions.

To understand GHF and the source of CH special funding in city district, the research team surveyed the health bureau of city district by self-made questionnaire.

Two CH centers and 2 CH stations, which are smaller in scale and serve as satellite outposts of CH centers, were selected randomly in 1 of 220 districts. Outpatient prescriptions written by each selected institution in September of 2007, 2008, 2009, 2010, and 2011 were chosen and coded, and 100 prescriptions were obtained by following a systematic sampling of 1 in every 5 prescriptions. Because of their differences in scale and health resource allocation, CH centers, and CH stations were studied separately.<sup>[27]</sup>

Data collection was carried out by designated staff from health bureaus of the participating cities, under the coordination of the Chinese Ministry of Health. The research team convened the designated staff members; trained them to use uniform prescription review forms and processes; supervised the prescription review in the field; and conducted random visits, double-blinded data entry, logical data checks, and agreement tests to ensure the quality of the data.

**2.1.3. Data analysis.** The data collected by city health officials were submitted to the research team, entered into the database system EpiData 3.0, and analyzed by the statistical analysis software SPSS, version 19.0. Descriptive statistics were used to show the prescribing indicators in the 5 years (2007, 2008, 2009, 2010, and 2011), by institution type (CH centers and stations).

Normality of distribution was determined by QQplots and Shapiro–Wilk test. Because the data were normally distributed, Independent-Samples *t* test was applied to analyze the differences between institution types. Bivariate test was applied to analyze the correlation between GHF and PB. Statistical significance was accepted when *P* values were equal to or less than .05.

In order to increase the understanding of the extent of inappropriate prescribing in China, the research team compared its findings with the rational drug use standards recommended by WHO.<sup>[24,25,28–32]</sup>

## 2.2. Study results

From 2007 to 2011, the study had been lasted for 5 consecutive years. There were 36 cities involved in China, which covered all provinces (autonomous regions and municipalities directly under the central government) in addition to Hong Kong, Macao, and Taiwan regions. Table 1 shows the quantity of surveyed institutions and prescriptions.

Table 2 shows the overall situation of GHF in 36 cities. From 2007 to 2011, healthcare funding and the proportion of healthcare funding in the fiscal expenditure increased year by year in the cities district. Healthcare funding growth rate of chain relative ratio was the biggest in 2011. CH special funding increased year by year and amounted to 41.0952 million Chinese yuan in 2011. The proportion of CH special funding in healthcare funding reached the highest (29.71%) in 2009.

**Table 1**  
Survey object and quantity, 2007–2011.

Year	CH centers	CH stations	Prescriptions
2007	1917	5231	75,100
2008	2274	4245	80,300
2009	2408	5870	92,900
2010	2436	5694	90,600
2011	2516	5728	103,200
Total	11,551	26,768	442,100

Source: Survey data calculated by the authors. Note: About 100 prescriptions were sampled in each institution for each year between 2007 and 2011. A total of 36 cities were involved in China. CH=community health.

Table 3 presents the overall findings on the 6 prescribing indicators by community institution type and by year. Comparing 3 of the 6 indicators for which the WHO's International Network standards exist, this study confirmed that doctors prescribed many more drugs, more antibiotics, and more injections than the WHO's recommendations in China's CH institutions.<sup>[28,29,33]</sup>

The estimates for the 5 prescribing indicators showed significant decreases over the 5-year period ( $P < .05$ ). The cost of drugs per prescription, adjusted by the retail price index of medicines, showed a significant decrease between 2007 and 2011, but the decrease is small in magnitude. PB, in terms of both the number of drugs per prescription and the percentage of prescriptions with antibiotics, injections, or hormones, were similar for CH centers and for stations (not significant).

Table 4 shows the impact of the GHF on PB in CH institutions in China. There was significant negative association between GHF and all indicators of PB. Further, most of the absolute value of correlation coefficients are more than 0.5, which shows very close association between GHF and PB. Our data confirmed that, with the increase of GHF, community doctors' PB gradually improved over the 5-year period.

### 3. Discussion

This study firstly explored the impact of the GHF on PB in nationwide CH institutions, which differs somewhat from previous studies. We find that government appears to have perfected health funding mechanism and increased funding of the healthcare system. The proportion of GHF in the total health expenses gradually raised, which successfully lowered out-of-pocket spending.<sup>[34–36]</sup>

Our analysis suggests that increasing funding of the healthcare system can effectively improve the PB and alleviate DMIMs problem in China. For example, along with formal implementation of the new healthcare reform in 2009, the patients' feeling and complaint of "too difficult and too expensive to see a doctor," one of the key public policy issues, still exists. So the Chinese Ministry of Health has rolled out policies that allowed zero markup for drugs on the WHO's essential medicines list, and there is more vigorous supervision of the pharmaceutical market and prescribing behavior (PB). At the same time, the government sharply increased health funding. As a result, PB have been improved since 2009. Key prescribing indicators were statistically significant different respectively between 2007 and 2011 ( $P < .05$ ). Further, this study showed the significant negative association between health funding and PB (correlation coefficients more than .5).

Our findings were confirmed by those findings in other countries. In the United Kingdom, the evidence suggested that the funding had a marked effect on primary care prescribing volume and cost on some practices who could achieve targets and hence incentive payments.<sup>[37]</sup> A funding scheme can be an important component of a prescribing strategy.<sup>[38]</sup> In the United States, the evidence suggested that the program of federal funding for e-prescribing in the Medicare Improvements for Patients and Providers Act did indeed succeed.<sup>[39]</sup> In the Netherlands, the evidence suggested that independent funding can be a help in changing prescription behavior of general practitioners, and the intervention resulted in a cost-saving of roughly €3000 per general practitioner.<sup>[40]</sup>

The government should know the importance of funding of the healthcare system. Reforming the mechanism of DMIMs is actually equal to how to compensate the healthcare system. Few medical institutions have enough funding resources to bear the losses from separation of medical institutions and drug in the current medical system of China. Breaking away from drug profits will bring disaster to medical institutions of China. In fact, the United States, France, and other developed countries can practice the separation of medical institutions and drug because the GHF is enough to maintain medical institutions.<sup>[41]</sup> Studies have showed that each 100 Chinese yuan additional funding of the healthcare system can reduce the social drug costs 660 Chinese yuan, which is one of the main responsibilities of public funding.

To the best of our knowledge, to date, this study is the largest scale study investigating the association between the GHF and the prevalence of inappropriate drug prescribing in China. The large sample size significantly increased statistical power to detect the

**Table 2**  
Health funding in cities district, 2007–2011.

Year	Healthcare funding*	Growth rate of chain relative ratio (%)	The fiscal expenditure	Proportion of healthcare funding in the fiscal expenditure (%)	CH special funding*	Growth rate of chain relative ratio (%)	Proportion of CH special funding in healthcare funding (%)
2007	6401.08		127766.07	5.01	1536.65		24.01
2008	7824.7	22.24	147635.85	5.3	1982.69	29.03	25.34
2009	9092.87	16.21	176218.41	5.16	2701.53	36.26	29.71
2010	11393.97	25.31	177753.04	6.41	3020.07	11.79	26.51
2011	14594.3	28.09	217500.75	6.71	4109.52	36.07	28.16

Source: Survey data calculated by the authors. Note: The exchange rate of US dollars to Chinese yuan was 1:6.4 in 2011.

CH=community health.

\* Measure unit: Ten thousand Chinese yuan.

**Table 3**  
**Prescribing indicators for urban CH institutions in China, 2007–2011.**

Indicator	2007	2008	2009	2010	2011	WHO standard*
<b>Center</b>						
Average number of drugs prescribed	2.55	2.59	2.41	2.40	2.28	1.6–1.8
Percent with a injection prescribed	35.44	33	34.72	32.41	28.26	13.4–24.1
Percent with an antibiotic prescribed	45.06	43.68	41.33	39.69	31.09	20.0–26.8
Percent with a hormone prescribed	8.24	7.19	7.11	7.69	5.34	
Percent with 2 or more antibiotics prescribed	13.5	11.17	10.31	10.36	7.94	
Average prescription cost (CNY) <sup>†</sup>	54.44	61.73	62.46	57.47	52.35	
<b>Station</b>						
Average number of drugs prescribed	2.46	2.43	2.50	2.28	2.16	1.6–1.8
Percent with a injection prescribed	34.88	36.82	41.97	37.39	32.9	13.4–24.1
Percent with an antibiotic prescribed	42.1	44.31	45.04	42.28	33.22	20.0–26.8
Percent with a hormone prescribed	6.94	7.05	6.71	7.56	3.9	
Percent with 2 or more antibiotics prescribed	10.73	11.32	11.65	10.14	6.58	
Average prescription cost (CNY) <sup>†</sup>	51.76	57.34	54.53	52.75	49.82	

Sources: Survey data calculated by the authors; recommended values reported by the WHO, Notes 28 and 33 in text.

CH = community health, WHO = World Health Organization.

\* The WHO provides a normal range for these 3 indicators only, so the comparison does not include the other 3 indicators studied. Notes: The results of statistical significance testing were not included because of space constraints; they are available from the authors upon request.

<sup>†</sup> The exchange rate of US dollars to Chinese yuan was 1:6.4 in 2011; the cost is adjusted by the Retail Price Index of Medicines.

association between the GHF and the prevalence of inappropriate drug prescribing. However, one limitation that needs to be addressed is the period during which the study was carried out. Moreover, the ecological design of the study is limited in terms of extrapolation. Finally, some information was collected from a self-reported questionnaire and the response bias was therefore unavoidable.

#### 4. Conclusion

This study provided the first robust nationwide data and analysis on some key prescribing indicators and funding of the healthcare system. It confirmed, for the first time, that the increased GHF had gradually improved PB on the whole although prescribing indicators are more than what is recommended by the WHO and inappropriate prescribing is still widespread in urban CH institutions of China. It is well known in China that the funding is one notable driver of inappropriate prescribing. Presently, a sizable portion of medical institutions' income comes from the profits from selling prescription drugs due to limited GHF.<sup>[26]</sup> The government should play a leading role in providing basic

medical services. Government funding should be mainly responsible for the cost of public health service which was provided equally to urban and rural residents.

It is very important that government should arrange health funding from a systemic perspective.<sup>[42,43]</sup> Policy makers must further perfect the compensation mechanism to medical institutions for gradually weakening the compensation function of drug sales in medical institutions.<sup>[44]</sup> Government should vigorously implement the separation of medical institutions and drug, and comprehensively cut off the direct interests relationship between the medical institutions, medical personnel, and drug marketing. China must find out a healthy sustainable development mode for medical institutions, which is the key to improve PB and change the situation of DMMIs.<sup>[45]</sup> The result of this study paves the way for further efforts to understand government's leading role in China's ongoing new healthcare reform.

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**Table 4**  
**Correlation coefficient between GHF And PB.**

PB (indicator)	Healthcare funding		CH special funding	
	Center	Station	Center	Station
Average number of drugs prescribed	-0.92	-0.91	-0.95	-0.84
Percent with a injection prescribed	-0.92	-0.34	-0.87	-0.23
Percent with an antibiotic prescribed	-0.97	-0.79	-0.97	-0.75
Percent with a hormone prescribed	-0.82	-0.72	-0.85	-0.74
Percent with two or more antibiotics prescribed	-0.93	-0.85	-0.96	-0.81
Average prescription cost (Chinese yuan)	-0.46	-0.58	-0.38	-0.55

Source: Authors' analysis.

CH = community health, GHF = government health funding, PB = prescribing behaviors.



## References

- [1] Blumenthal D, Hsiao WC. Privatization and its discontents: the evolving Chinese healthcare system. *N Engl J Med* 2005;353:1165–70.
- [2] Xiaodong G, Huigang L, Yajiong X, et al. An analysis of China's national essential medicines policy. *J Public Health Policy* 2011;32:305–19.
- [3] Eggleston K, Li L, Meng Q, et al. Health service delivery in China: a literature review. *Health Econ* 2008;17:149–65.
- [4] Wagstaff A, Yip W, Lindelow A, et al. China's health system and its reform: a review of recent studies. *Health Econ* 2009;18:S7–23.
- [5] Manuel R. China's Health System and the Next 20 Years of Reform. In: Garnaut, R., Golley, J., Song, L.G., editors. *China: The Next 20 Years of Reform and Development*. Canberra: Australian National University Press; 2010. 363–392.
- [6] Liu X, Yi Y. *The Health Sector in China: Policy and Institutional Review*. World Bank, Washington, DC:2004.
- [7] Wang S. China's health system: from crisis to opportunity. *Yale-China Health J* 2004;3:5–0.
- [8] Yan Y, Zhang G, Chen Y, et al. Study on the injection practices of health facilities in Jingzhou district, Hubei, China. *Indian J Med Sci* 2006;60:407–15.
- [9] Wang W, Ban X, Liu Z, et al. Investigation on knowledge about rational drug use in 2419 inpatients. *China Pharmacy* 2006;17:471–3.
- [10] Zhang Y, Li S, Li Y, et al. Analysis of the use of medicine in the fixed medical institution's clinics of the New Rural Cooperative Medical System. *Med Philos* 2007;27:42–3.
- [11] Wang X, Dong J. A study on the causes and the countermeasures of the difficulty and high cost of getting medical service. *Chinese J Hosp Admin* 2007;23:658.
- [12] Dong L, Yan H, Wang D. 2011. Drug prescribing indicators in village health clinics across 10 provinces of Western China. *Fam Pract* 28:63–67.
- [13] Chen W, Tang S, Sun J, et al. Availability and use of essential medicines in China: manufacturing, supply, and prescribing in Shandong and Gansu provinces. *BMC Health Serv Res* 2010;10:211.
- [14] Liang L, Wu Q, Gao L, et al. Factors contributing to the high prevalence of multidrug-resistant tuberculosis: a study from China. *Thorax* 2012;67:632–8.
- [15] Reynolds L, McKee M. Serve the people or close the sale? Profit-driven overuse of injections and infusions in China's market-based healthcare system. *Int J Health Plann Manage* 2011;26:449–70.
- [16] Ross-Degnan D, Laing RO, Quick JD, et al. A strategy for promoting improved pharmaceutical use: the International Network for Rational Use of Drugs. *Soc Sci Med* 1992;35:1329–41.
- [17] World Health Organization. How to investigate drug use in health facilities: selected drug use indicators [Internet]. Geneva: WHO Press; 1993 [cited 2010 Jul 12]. (EDM Research Series No. 007, WHO/DAP/93.1). Available from: <http://apps.who.int/medicinedocs/en/d/Js2289e/>. Accessed April 6, 2013
- [18] Quick JD, Thuo HM, Gesami JO. Inpatient Drug Use Indicators: A Pilot Study From Kenya, East Africa. *INRUD News* [serial on the Internet]. 1994; 4:9 [cited 2010 Jul 12]. Available from: <http://www.inrud.org/documents/upload/INRUD-News-v4i2-July-1994.pdf>. Accessed April 6, 2013
- [19] Quick JD, Rankin JR, Laing RO, et al. *Managing Drug Supply*. 2nd ed. West Hartford, CT: Kumarian Press; 1997.
- [20] Rational Pharmaceutical Management Plus Program. How to Investigate Antimicrobial Drug Use in Hospitals: Selected Indicators. Working Draft. Arlington, VA: Center for Pharmaceutical Management; 2001.
- [21] Yang X. *Study on Rational Use of Drugs in Three-Tiered Medical Organizations in Rural Areas of Western China*. Wuhan: Huazhong University of Science and Technology; 2006. Chinese.
- [22] Ministry of Health, People's Republic of China. Measures for the Administration of Prescriptions [Internet]. Beijing: Ministry of Health; 2007 Feb 14 [cited 2012 Apr 9]. (Official Ministry Report No. 53). Chinese. Available from: [http://www.gov.cn/ziliao/flfg/2007-03/13/content\\_549406.html](http://www.gov.cn/ziliao/flfg/2007-03/13/content_549406.html). Accessed April 6, 2013
- [23] Graden SE, Schafermeyer KW. Performance reporting for managed care prescription programs. *J Manage Care Pharm* 1998;4:160–6.
- [24] WHO Collaborating Center on Pharmaceutical Policy. *Course in Pharmaceutical Policy Analysis: Participant Guide* [Internet]. Cambridge, MA: The Center; 2009 Mar 22 [cited 2012 Apr 4]. Available from: [http://www.whocpp.org/training/medicChina2009/Participant\\_Guide\\_28-March-2009.pdf](http://www.whocpp.org/training/medicChina2009/Participant_Guide_28-March-2009.pdf). Accessed April 6, 2013
- [25] World Bank. *World Development Report 2009: Reshaping Economic Geography* [Internet]. Washington, DC: World Bank; 2008 Nov 6 [cited 2012 Apr 20]. Available from: <http://web.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/0,,contentMDK:23080183~pagePK:478093~piPK:477627~theSitePK:477624,00.html>. Accessed April 6, 2013
- [26] Ministry of Health, People's Republic of China. *China Health Statistics Yearbook 2010* [Internet]. Beijing: Peking Union Medical College Press; 2010 Aug [cited 2010 Oct 8]. Chinese. Available from: <http://www.moh.gov.cn/publicfiles/business/htmlfiles/zwgkzt/ptjnj/year2010/index2010.html>. Accessed April 6, 2013
- [27] Government of the People's Republic of China. State Administration of Traditional Chinese Medicine on the Basic Standards of Community Health Centers and Stations [Internet]. Beijing: Ministry of Health; 2006 Jun 30 [cited 2012 Apr 9]. (Official Ministry Report No. 240). Chinese. Available from: [http://www.gov.cn/zwgk/2006-08/10/content\\_359200.html](http://www.gov.cn/zwgk/2006-08/10/content_359200.html). Accessed April 6, 2013
- [28] Isah AO, Ross-Degnan D, Quick J, et al. The Development of Standard Values for the WHO Drug Use Prescribing Indicators [Internet]. Geneva: World Health Organization International Conferences on Improving Use of Medicines; 1997 [cited 2008 Jul 8]. Available from: [http://archives.who.int/icium/icium1997/posters/1a2\\_txt.html](http://archives.who.int/icium/icium1997/posters/1a2_txt.html). Accessed April 6, 2013
- [29] World Health Organization. *Guide to Drug Financing Mechanisms* [Internet]. Geneva: WHO Press; 1998 [cited 2010 Jul 12]. Available from: <http://apps.who.int/medicinedocs/en/d/Jh2928e/7.1.2.html>. Accessed April 6, 2013
- [30] World Health Organization. *Medicines Use in Primary Care in Developing and Transitional Countries: Fact Book Summarizing Results From Studies Reported Between 1990 and 2006* [Internet]. Geneva: WHO Press; 2009 Mar [cited 2009 Apr 8]. Available from: [http://www.who.int/medicines/publications/primary\\_care\\_8April09.pdf](http://www.who.int/medicines/publications/primary_care_8April09.pdf). Accessed April 6, 2013
- [31] Le Grand A, Hogerzeil HV, Haaijer Ruskamp FM. Intervention research in rational use of drugs: a review. *Health Policy Plann* 1999;14:89–102.
- [32] Laing R, Hogerzeil H, Ross-Degnan D. Ten recommendations to improve use of medicines in developing countries. *Health Policy Plann* 2001;16:13–20.
- [33] World Health Organization. *Using Indicators To Measure Country Pharmaceutical Situations: Fact Book on WHO Level I and Level II Monitoring Indicators* [Internet]. Geneva: WHO Press; 2006 [cited 2012 Apr 5]. (WHO/TCM/2006.2). Available from: <http://www.who.int/entity/medicines/publications/WHOTCM2006.2A.pdf>. Accessed April 6, 2013
- [34] Central Committee of the Communist Party of China and the State Council. *Opinions on Deepening the Healthcare System Reform*. Beijing: The Central Committee of the Communist Party of China and the State Council; 2009.
- [35] The State Council of China. *Implementation Plan for the Recent Priorities of the Healthcare System Reform (2009–2011)*. Beijing: The State Council of China; 2009.
- [36] World Health Organization. *The World Health Report—Financing for Universal Coverage*. Geneva: World Health Organization; 2010:23–25.
- [37] Walley T, Murphy M, Codd M, et al. Effects of a monetary incentive on primary care prescribing in Ireland: changes in prescribing patterns in one health board 1990–1995. *Pharmacoepidemiol Drug Saf* 2000; 9:591–8.
- [38] Bateman DN, Campbell M, Donaldson LJ, et al. A prescribing incentive scheme for non-fundholding general practices: an observational study. *BMJ* 1996;313:535–8.
- [39] Joseph SB, Sow MJ, Furukawa MF, et al. E-prescribing adoption and use increased substantially following the start of a federal incentive program. *Health Affairs (Millwood)* 2013;32:1221–7.
- [40] Martens JD, Werkhoven MJ, Severens JL, et al. Effects of a behaviour independent financial incentive on prescribing behaviour of general practitioners. *J Eval Clin Pract* 2007;13:369–73.
- [41] Kutzin J, Cashin C, Jakab M, et al. *Implementing Health Financing Reform, Lessons From Countries in Transition*. World Health Organization, Geneva:2010.
- [42] McIntyre D, Garshong B, Mtei G, et al. Beyond fragmentation and towards universal coverage: insights from Ghana, South Africa and the United Republic of Tanzania. *Bull World Health Organ* 2008;86:871–6.
- [43] Kutzin J: Myths, Instruments, and Objectives in Health Financing and Insurance. In: Holst J, Brandrup-Lukanow A (Eds.), *Extending Social Protection in Health Developing Countries Experiences, Lessons Learnt and Recommendations*. Eschborn: German Agency for Technical Operation and Federal Ministry for Economic Co-operation and Development; 2007.
- [44] Li Y, Xu J, Wang F, et al. Overprescribing in China, driven by financial incentives, results in very high use of antibiotics, injections, and corticosteroids. *Health Affairs* 2012;31:1075–82.
- [45] Yi WC-M, Hsiao WC, Chen W, et al. Early appraisal of China's huge and complex health-care reforms. *Lancet* 2012; 379: 833–842.