

CHINA'S HEALTH SYSTEM AND ITS REFORM: A REVIEW OF RECENT STUDIES

ADAM WAGSTAFF^{a,*}, WINNIE YIP^b, MAGNUS LINDELOW^c and WILLIAM C. HSIAO^d

^a*Development Research Group, The World Bank, Washington, DC, USA*

^b*Department of Public Health, University of Oxford, UK*

^c*East Asia & Pacific Region, The World Bank, Washington, DC, USA*

^d*Department of Health Policy and Management, Harvard University, USA*

SUMMARY

This paper provides a survey of the recent empirical research on China's 'old' health system (i.e. prior to the spate of reforms beginning in 2003). It argues that this research has enhanced our understanding of the system prior to 2003, in some cases reinforcing conclusions (e.g. the demand-inducement associated with perverse incentives) while in other cases suggesting a slightly less clear storyline (e.g. the link between insurance and out-of-pocket spending). It also concludes that the research to date points to the importance of careful evaluation of the current reforms, and its potential to modify policies as the rollout proceeds. Finally, it argues that the research on the pre-2003 system suggests that while the recently announced further reforms are a step in the right direction, the hoped-for improvements in China's health system will far more likely occur if the reforms become less timid in certain key areas, namely provider payments and intergovernmental fiscal relations. Copyright © 2009 John Wiley & Sons, Ltd.

KEY WORDS: China; health reform; health systems; health insurance; provider payments; intergovernmental fiscal relations

1. INTRODUCTION

Few health systems are as fascinating as China's. A textbook model of command and control between 1949 (when the Communists assumed power) and 1978 (when Deng Xiaoping pointed the country firmly down the road of a market economy), China's health system was transformed within the space of a few years into arguably the world's most market-oriented health system. In 2003, the country's policymakers publicly acknowledged the limitations of such a system and began to implement a series of reforms aimed at correcting its perceived shortcomings.

Much of the economic history of China's health system between 1949 and 2002 is well documented, and inevitably reflects the trends in China's economy and society in that period. Predictably, the policies after its economic liberalization policy (1978) reduced people's access to health care (measured in terms of utilization rates), increased the risk of large out-of-pocket expenditures, widened disparities in health and health care, reduced the pace of health improvements and increased health sector inflation. A number of recent studies by economists (and others) shed new light on these predictable impacts. Collectively, they do not cast doubt on the received wisdom, but they do add to our understanding of China's health system during this period, and in some cases raise questions at the margin. Our first objective is to synthesize the new material and examine its implications for our understanding of the pre-2003 health system. Thus Section 2 thus briefly reviews the received wisdom, whereas Section 3

*Correspondence to: Development Research Group, World Bank, 1818 H Street NW, Washington, DC 20433, USA.
E-mail: awagstaff@worldbank.org

describes the new evidence on the pre-2003 system and discusses its origins and consequences. The reforms since 2003 have inevitably been the subject of less study than the pre-2003 system. Our second and third objectives are to summarize these reforms, and to synthesize the evidence to date on their impacts. Thus Section 4 describes the post-2002 reforms, whereas Section 5 discusses the evidence to date on their impacts. Section 6 describes our conclusions. Our hope is that our synthesis of recent evidence on China's 'old' and 'new' health systems will help inform the ongoing reform process.

2. CHINA'S HEALTH SYSTEM 1949–2002: A BRIEF HISTORY¹

During Mao's era, health insurance and to some extent health care delivery were organized around the workplace. The Cooperative Medical Scheme (CMS) financed health care for members of the agricultural commune, whereas the Labor Insurance Scheme (LIS) and Government Insurance Scheme (GIS) financed health care for state-owned enterprise (SOE) workers and government officials, respectively. Barefoot doctors attached to the agricultural commune and workplace clinics provided first-level care, whereas second-level care was provided in township health centers (THCs) in rural areas and in district hospitals and enterprise hospitals in urban areas. Tertiary care was provided in county and city hospitals, and pharmacies were typically integrated into facilities. Communes, local and central governments all collected taxes, which were used to pay demand-side subsidies to the health insurance programs and supply-side subsidies to providers. The government kept input prices (including salaries) artificially low, which helped hold down the prices providers were allowed to charge patients; this, combined with near-universal health insurance, meant that out-of-pocket payments were minimal. Public health was highly developed and accorded a high priority; its delivery relied heavily on mass associations to reinforce the efforts of public health officials.

Deng Xiaoping reformed the command-and-control economy. The agricultural commune was quickly replaced by household production, profit-making village and township enterprises were set up, and SOEs were granted substantial financial autonomy. Autonomy spread throughout government too, in part out of necessity. As the old tax base shrank, government revenues declined as a share of GDP, and central government's control over the remaining revenues diminished. Local governments not only continued to be responsible for health, but also became responsible for finding revenues to fund health care.

These changes had dramatic and unintended consequences for the health sector. The breakup of the commune led to the almost total collapse of the CMS (Hsiao, 1984; Liu, 2004). Financial autonomy for SOEs meant many fell into financial difficulty; a large number closed and SOE employment levels fell (Cai *et al.*, 2008). SOE workers who kept their jobs often found their employer was unable to honor its commitments to the LIS scheme (firm-level risk pools rather than a national program). Insurance coverage plummeted in rural areas, and declined in urban areas (Gao *et al.*, 2001); the share paid out-of-pocket by those who kept their coverage increased (Akin *et al.*, 2004) due in part to rapidly rising costs (Liu and Hsiao, 1995). The decline in tax revenues and fiscal decentralization also left their mark on the health sector. An increasingly close link emerged between a local government's fiscal capacity and its health spending (Park *et al.*, 1996), resulting in geographic inequalities in government spending. With diminished revenues, the government saw little alternative but to privatize providers (barefoot doctors opened private village clinics) or to make them financially autonomous. The budget provided to public facilities was insufficient to cover their fixed costs and they had to resort to filling the gap by charging patients; in most localities a personal responsibility system emerged under which health facility staff

¹The review is very brief. A compact description of China's health system is provided by Leung *et al.* (2007). The developments of the system over the period 1949–2002 and its achievements and problems are discussed in Hsiao (1984), Hsiao (1995), Blumenthal and Hsiao (2005), Yip and Hsiao (2008) and Ma *et al.* (2008).

were rewarded for good financial performance and fined for financial shortfalls (Zheng and Hiller, 1995).

Anxious to ensure that basic care remained affordable, the government regulated prices, setting prices below cost on services but above cost on drugs and high-tech tests. What seems not to have been anticipated was that many providers would (and apparently did) respond to these incentives by inducing demand and shifting their efforts away from low-margin activities to high-margin ones.² Possible consequences included heavy investment in high-tech equipment and a consequent shift from labor-intensive to capital-intensive care³; a high share of spending on drugs⁴; the delivery of medically unnecessary care⁵; rapid cost escalation⁶ and an ever larger share of health spending financed out-of-pocket.⁷

The 1990s saw the introduction of some local efforts (often with donor support) to resuscitate CMS, but most were unsuccessful.⁸ Central government focused its efforts on urban health insurance. From 1995 onwards a new scheme to cover *all* urban formal-sector workers (but not their dependents) was launched, known as Basic Medical Insurance (BMI).⁹ Within BMI, some efforts were made to control costs: initially, these were restricted to demand-side cost-sharing through the use of medical savings accounts (MSAs), building on Singapore's experience; a few localities, however, also explored supply-side cost-sharing through the use of prospective payments. In 2000, price regulations were changed on drugs, with a shift to controlling only retail prices and for only certain drugs (Meng *et al.*, 2005).

The tax system was also reformed during the mid-1990s to fit the new market economy, and the central-provincial relationships were reformed with a new tax revenue-sharing system that directed most revenues to central government which then provided transfers to provincial governments in proportion to share of total revenue they generated (Wong and Bird, 2008). This formula exacerbated the disparity between rich and poor provinces in resources to fund health care.

3. NEW EVIDENCE ON CHINA'S OLD HEALTH SYSTEM

We look first at the performance of China's health system during this period on the primary goal of any health system – improving population health. We find that although the new evidence supports earlier findings of spectacular achievements during the 1950s and 1960s, it also suggests that China underachieved in the latter part of the period given its rapid economic growth. We find evidence too of sizeable inequalities in health and health care utilization. In addition to improving population health, health systems typically try to provide people with protection against the risk of large out-of-pocket payments. We present recent evidence on this question. It suggests that the incidence of catastrophic health expenses increased during the 1990s, and by the end of the 1990s had become high by regional

²The hard evidence on this issue is somewhat recent, and is presented in Section 3.

³Liu and Hsiao (1995) identified rapid adoption of new technology as a major driver of the cost growth in China's health care system. In Shanghai, Caesarean sections increased faster than could be explained by increases in risk factors (Cai *et al.*, 1998). In the late 1990s, China had more MRI scanners per million people than more affluent Thailand or Mexico and around two-and-a-half times as many as would be expected on the basis of its per capita income at the time (Wagstaff *et al.*, 2009b).

⁴In 2003 nearly 45% of total health spending was on drugs, compared with an OECD average of around 15% (Wagstaff *et al.*, 2009b).

⁵Evidence on this until recently was actually rather thin. The evidence is presented in Section 3.

⁶Between 2003 and 2004, the average cost per case increased by as much as 15–20% in central and general township health centers and county hospitals, even after adjusting for case mix (relative numbers of inpatient, emergency and outpatient care) and other factors such as bed stock and local income per capita (Wagstaff *et al.*, 2009b).

⁷Out-of-pocket spending as a share of total health spending grew from 29% in 1978 to over 60% in 2000 (Wagstaff *et al.*, 2009b).

⁸Efforts in this period included the RAND Sichuan CMS experiment in mid-1990s (Cretin *et al.*, 1990), the WHO 14-county study in the early 1990s (Carrin *et al.*, 1999), the UNICEF 10-county study over the period 1997–2000, and the World Bank Health VIII project in the late 1990s (Wagstaff and Yu, 2007). For a general discussion of attempts to resuscitate CMS, see Xueshan *et al.* (1995).

⁹On the urban reforms, see Wang and Huang (2000) and Liu (2002).

standards. Next we present new evidence on one of the potential causes of these trends – the dramatic decline in health insurance coverage that accompanied the shift to the market economy during the 1980s. The evidence suggests that although the drop in insurance coverage was one factor, it cannot have been the only one. We turn next to two other possible causes – changes in the level and geographic distribution of government health spending, and rapid cost inflation and its causes.

3.1. Trends in health outcomes

New data confirm that China reduced mortality dramatically after the establishment of the People's Republic in 1949 (cf. e.g. Tang, 2000; Koblinsky, 2003; Banister and Hill, 2004). In 1960, China's under-five mortality rate stood at 225 per 1000 live births. By 1980, the figure had fallen to just 64. Recent data on poverty in China and new global mortality data from UNICEF help put these numbers into perspective. In 1981, an estimated 84% of China's population was living on less than a dollar a day at today's prices; the figure for the developing world today is 25% (Chen and Ravallion, 2008).¹⁰ Yet under-five mortality in the developing world today is around 74 per 1000 – higher than that of China in 1980 when three times the fraction of people were living in severe poverty.¹¹

These achievements were not sustained. Using cross-country regressions linking under-five mortality to lagged mortality and per capita income, Wagstaff *et al.* (2009b) conclude that although China was an overperformer in the 1960s and 1970s (its rate of reduction exceeded its 'expected' rate), it was an underperformer in the 1980s and 1990s. China's performance contrasts with that of Indonesia and Malaysia who went on to exceed expectations even more spectacularly in the 1980s and 1990s. The same study also found that while China reduced tuberculosis (TB) mortality at quite a rapid rate over the period 1990–2004 (3% per annum), neighboring countries reduced TB mortality even faster, and many also reduced prevalence faster.

3.2. Inequalities in health and health care utilization

Some recent studies suggest that equity was adversely affected by the market-liberalizing reforms of the late 1970s. Zhang and Kanbur (2005) argue that the gap in infant mortality between urban and rural areas widened from 1978 onwards. Liu *et al.* (1999) found evidence of a widening gap in health status and utilization between urban and rural residents, with rural residents actually seeing a decline in hospital days between the mid-1980s and 1993. The results of Liu *et al.* (2008b) are less clear-cut. They looked at changes between 1993 and 1998 and between 1998 and 2003 in the gaps between the poorest and richest quintiles in prenatal care, hospital deliveries, postnatal care and immunization, separately for rural and urban areas. They found no clear pattern, though for most indicators inequalities increased between 1993 and 1998. On the other hand, data presented by Yip (2009) show that equity improved using data from 1991 to 2004.

Wagstaff *et al.* (2009b) use data from the maternal and child health (MCH) surveillance system and county-level economic data to look at inequalities in infant, under-five and maternal deaths across counties. The inequalities are quite marked: in the poorest fifth of counties covered by the system, the maternal mortality ratio in 2003 was 73 per 10 000 live births; in the richest fifth, the ratio was just 17 per 10 000. They also compare inequalities in child malnutrition by wealth in China and other countries, using the China Health and Nutrition Survey (CHNS) for China and the Demographic and Health Survey (DHS) in other countries. Inequalities in child malnutrition in China were found to be high by international standards. Using the same data, Yip (2009) found that these inequalities do not appear to have widened or narrowed.

¹⁰Actually the new World Bank 'dollar-a-day' poverty line is \$1.25 at 2005 prices, converted using 2005 Purchasing Power Parities.

¹¹Data are from UNICEF www.childinfo.org and are for 2007.

3.3. Out-of-pocket spending and financial protection

The growth in this period in the share of health spending financed through out-of-pocket payments is well documented. Recent research sheds light on the financial hardship that this has caused. Using data from the National Health Survey (NHS), Yip (2009) reports that the out-of-pocket expenses associated with a single inpatient admission increased from 70 to 80% of per capita income in 1993 to more than 200% in 2003. Unsurprisingly, perhaps, she found that the fraction of people not seeking care because of financial reasons increased from 12 to 18% over the same period. In 1993, the percentage was higher in rural areas; this gradient reversed in 2003. However, within each the urban or rural area, the percentages not seeking care for financial reasons are highest in the poorest areas sampled.

Despite the high out-of-pocket payments, many people continued to seek and receive care. This is reflected in a high incidence of catastrophic out-of-pocket spending and high rates of impoverishment due to health expenses. Van Doorslaer *et al.* (2007) found that the fraction of the population experiencing 'catastrophic' health expenses (whether defined as more than 25% or more than 40% of non-food consumption) was higher in China in 2000 than elsewhere in Asia, and higher still among the poor (in most other countries catastrophic rates were found to be lower among the poor). Van Doorslaer *et al.* (2006) found that out-of-pocket spending in China in 2000 added 2.6% points to the dollar-a-day poverty headcount, raising it by 19%; in terms of the percentage increase in the headcount, only Vietnam came out with a higher figure among the 11 countries studied. Liu *et al.* (2003) found that in rural China out-of-pocket payments raised the poverty headcount by 26% in 1993 and by 45% in 1998. Liu *et al.* (2008b) found that the incidence of catastrophic payments (health spending exceeding 30% of capacity to pay) fell in urban areas between 1998 and 2003, but increased in rural areas over the same period.

3.4. Insurance and its impacts

One possible explanation for the slowdown in health improvements, the emergence of health inequalities and the high incidence of catastrophic out-of-pocket expenses during the pre-2003 period is the reduction in insurance coverage that accompanied the shift to the market economy (cf. e.g. Liu, 2004). Recent research sheds light on this issue, although not all of it supports this thesis.

Two studies found little evidence that having insurance increases utilization. Henderson *et al.* (1998) using data from three waves of the CHNS found that people with insurance were no more likely to seek care when ill than those without. Data problems may have contributed to this finding, but this is unlikely to be true of the findings of the study by Zhang *et al.* (2007), who use data from the 2003 NHS, and who also found muted effects of insurance. They found that after controlling for gender, household income and education, insurance did not affect the probability of someone suspected of having TB-seeking treatment, or the probabilities of them having a sputum test or x-ray.¹² Having insurance did, however, increase the probability of them being referred upward to the TB dispensary.

By contrast, there are at least three studies covering this period that found evidence that having insurance does increase utilization. Liu and Zhao (2006) found that the introduction of the BMI scheme in Zhenjiang in 1995 (which was associated with a substantial increase in demand-side cost-sharing but also changes to the way providers were paid) led to increased utilization of outpatient services but decreased use of inpatient and emergency care. Gao *et al.* (2007), using data from the 1993, 1998 and 2003 NHS, found that – among the elderly – the probability of being hospitalized during this period was higher among those with insurance. This study does not take into account, however, the influences on hospitalization other than insurance, or the fact that insurance may be endogenous. Wagstaff and

¹²The effect of insurance on the probability of a sputum test was not significant for women at the 95% level, but was for men. The 95% confidence for the male odds ratio almost includes 1.00.

Lindelow (2008) take both factors into account. Using data from three surveys¹³ (two of which are panel datasets), they found that insurance increased the probability of using health services, reduced the probability of using private providers, and increased the level of provider at which care was received.

The empirical research is also ambiguous on the effect of insurance on financial protection. Two studies focus on the impact of more generous coverage among those already insured. Hu *et al.* (1999) compare workers without any coverage, workers with partial coverage and workers with full coverage. They found that workers with no coverage had out-of-pocket spending that was six times that of workers with 'full' coverage (who accounted for 36% of their sample) but only twice that of workers with 'partial' coverage (59% of their sample). Zhang (2007) examines the effect of the 2003 deductible reduction in Hangzhou's BMI scheme, which affected primarily private-sector workers because government workers' copayments were already capped. Her econometric study evaluated the impacts on total hospital expenditures, but her data tables (which do not make adjustments for changes in the composition of the groups) indicate that copayments stayed the same among government employees but fell by 27% among private-sector workers.

Surprisingly, several studies found the acquisition of insurance coverage led to *increased* out-of-pocket spending. Bogg *et al.* (1996) found that out-of-pocket spending increased faster in a rural county that had introduced voluntary community insurance than in an otherwise similar neighboring county that had not. Liu and Zhao (2006) found that the introduction of the BMI scheme in Zhenjiang in 1995 led to an increase in out-of-pocket payments, although largely among the higher income groups. Wagstaff and Lindelow (2008) found that insurance typically increased expected out-of-pocket payments *and* the risk of large out-of-pocket payments; this study takes into account the endogeneity of insurance and adjusts for observable confounders.

Insurance may lead to higher out-of-pocket spending and provide limited financial protection for several reasons: (i) it may increase the quantity of care used; (ii) it may encourage the use of higher-level (and more costly) providers and (iii) it may encourage providers to substitute towards a more costly style of care. As indicated above, the evidence is ambiguous on (i). Wagstaff and Lindelow (2008) present evidence consistent with (ii). Three recent studies shed light on (iii). Pan *et al.* (2008) examine the effect of insurance on the hospital costs of 10 medium-size urban hospitals in Guangdong province, focusing on four conditions where there is a high degree of consensus over diagnosis and treatment. They found that spending on insured patients was around 10% higher than that on uninsured patients.¹⁴ Zhang (2007) found that a reduction in the deductible in Hangzhou's BMI scheme raised hospital costs by 23%. Zhou *et al.* (2008) found that in the largest general hospital in Jiangsu province BMI affiliation is positively correlated with the amount of drug expenditures incurred in treating cancer patients.

Studies have also examined the equity consequences of the shift within the urban insurance system from the old GIS/LIS model to the new BMI model and its MSA scheme. Yip and Hsiao (1997) note that under an MSA scheme the less healthy (typically among the worse-off financially) are likely to pay a larger amount (in absolute terms and as a proportion of their income) than the more healthy (typically among the better-off financially). Under the Zhenjiang scheme where there is a personal MSA and a social pooling account (SPA), the SPA kicks in only after patients have exhausted the funds in their personal MSA. Patients then incur out-of-pocket payments up to 5% of their wages. After this threshold has been reached, SPA pays any remaining costs. The poor are likely to use up their MSA funds more quickly (the better-off are likely to have unused funds they can carry forward) and to incur larger out-of-pocket payments overall. This is borne out by the study of Yi *et al.* (2005), who found that

¹³Wagstaff and Lindelow use data from the 1991, 1993, 1997 and 2000 waves of the CHNS, the 2000 and 2003 waves of the Gansu Survey of Children and Families and the 1998 World Bank China Health VIII Project Baseline Survey.

¹⁴The data used in the study actually refer to 2003–2006, the period covered in the next section. However, the study does not speak directly to a reform in the 'balanced development' era.

while contributions to personal MSAs are typically progressive (being proportional to wages) and payments out of the SPA are higher (as a share of income) among the lower income groups, payments out of MSAs are regressive and out-of-pocket payments overall are even more regressive. MSA balances are, unsurprisingly, larger as a share of income among the better-off.

3.5. Government spending and its distribution

The evidence suggests, then, that the decline in insurance coverage probably put downward pressure on utilization, though whether it also contributed to the high incidence of catastrophic out-of-pocket expenditures is less clear. We turn now to other factors that seem likely to have contributed to the slowdown in health improvements, health inequalities and the high incidence of catastrophic health spending, beginning in this section with government health spending.

It is often claimed that, as a result of the reduction of tax revenues following the market-liberalizing reforms of 1978, government spending on health in China declined.¹⁵ Wagstaff *et al.* (2009b) show that this is not actually the case (cf. also Hsiao, 1995). They show that between 1978 and 2003, government health spending actually *grew* in real terms at 8.7% per annum, just 0.3% points per year less than per capita GDP.¹⁶ For the period 1990–2003 (no data are available before 1990), government spending on public health institutions (MCH centers, epidemic centers, etc.) increased in real terms, almost as quickly as total government spending on health. And the general recurrent spending component of government health spending (supply-side subsidies to hospitals and THCs) also increased during this period.

How did government manage to increase its health spending in real terms during this period? The explanation is twofold. First, GDP grew rapidly, so that although the government's *share* of health spending fell, government spending *in yuan terms* increased. Second, the government increased the share of its budget going to the health sector, reaching a peak of 6.1% in 1992 and then falling back to its 1980 value of 4% as government revenues started increasing as a share of GDP in the mid-1990s.

What *is* true is that government health spending in China did not follow the international pattern of an increasing share of budget spent on health as GDP grows; it simply kept pace with GDP. What is *also* true is that, as shown in a recent study (O'Donnell *et al.*, 2007), government health spending in China is decidedly pro-rich by international standards. The study included two Chinese provinces (Gansu and Heilongjiang), eight Asian countries and Hong Kong. Gansu and Heilongjiang ranked next to last and third-to-last, respectively, in terms of the share of government subsidy accruing to the poorest quintile; Nepal ranked last, whereas Hong Kong topped the list.

The pro-rich bias of government spending in China reflects three factors, only two of which are captured by the study; the results thus underestimate the likely degree of pro-rich inequality in government spending. First, within any province, the distribution of *general* government health spending (i.e. including social health insurance spending) is heavily skewed toward demand-side subsidies to the urban health insurance program whose members are disproportionately among the better-off: in 2002, according to the Ministry of Health's 2004 National Health Account (NHAs), a little more than 40% of general government spending went to the urban health insurance scheme. Second, within a province, the bulk of supply-side subsidies go to urban facilities which disproportionately serve the better-off: according to the 2004 NHA, city hospitals absorbed 50% of supply-side subsidies in 2002 and county hospitals 9%; THCs, by contrast, received just 7%.¹⁷ These two factors mean that within a

¹⁵For example, Dummer and Cook (2008) argue that both China and India 'are experiencing a decline in the amount of government funding for health care and this is a major issue that must be addressed'.

¹⁶Data from China's National Health Accounts.

¹⁷The other categories are public health facilities (6%), medical goods retailers (8%), ambulatory care facilities (13%) and other (6%).

province government spending is heavily oriented toward urban areas: Yip (2009) reports that government spending in urban areas is five to six times higher than in rural areas.

The third and uncaptured factor explaining the pro-rich bias of government health spending is that government spending on health is unequally distributed *across* provinces, as well as across counties within provinces. In part this reflects the fact that the BMI social health insurance scheme operates at the city level, and there is no mechanism to transfer resources from cities with low actuarial risks and high revenues to cities with less favorable conditions. Although city BMI schemes do not always break even in the short run, the city's formal-sector earnings distribution places limits on what can be spent per enrollee, with cities with less well-paid workers being able to offer less generous *de facto* benefit packages.

But the inter- and intra-provincial inequalities in government health spending also reflect the increased importance during this period of subprovincial governments in the finance of supply-side subsidies (West and Wong, 1995). In 2004, central government was responsible for just 2.6% of national government health spending (exclusive of social health insurance) (Ter-Minassian and Fedelino, 2008). It is subprovincial governments (counties in rural areas) rather than provincial governments that finance much of the remainder. Wagstaff *et al.* (2009b) report that in two rural counties in Guangxi around 85% of government spending on public health is financed by the county government.¹⁸ China's system of revenue-sharing and intergovernmental transfers does redistribute from rich to poor provinces, but it does not eliminate inequalities in fiscal capacity (cf. e.g. Shah and Shen, 2008; Wong and Bird, 2008). Thus, for example, in 2003 Beijing and Shanghai spent around RMB 16 per person on disease control programs, whereas Anhui and Guangxi (two poor provinces) spent around RMB 3–4 per person despite a much higher prevalence of TB (Wagstaff *et al.*, 2009b). In the same year, according to Martinez-Vazquez *et al.* (2008) government health spending overall was RMB 340 per capita in Beijing and just RMB 27 in Anhui.¹⁹

It is reasonable to hypothesize that these inequalities in government health spending were at least in part responsible for the geographic inequalities in the accessibility and quality of health facilities, their use and health outcomes. Interprovincial inequalities in key interventions such as antenatal care, hospital deliveries, postnatal care, immunization and hypertension have been shown to be large in a recent study by Liu *et al.* (2008b). The rate of hospital deliveries varies, for example, from 29.8% in Guizhou, a poor inland province, to 99.5% in Zhejiang, a prosperous southeastern province. West and Wong (1995) argue such differences reflect inequalities in government spending, and present evidence consistent with this statement.²⁰

3.6. Provider incentives and payment reform

The role of China's high-powered and perverse provider incentives in encouraging the delivery of inappropriate care and fuelling cost inflation is well known (see e.g. Hsiao, 1995). Recent research has

¹⁸Another noteworthy finding of the study is that in these two counties, household out-of-pocket-spending finances 41–44% of spending on public health programs. For the purpose of the study, public health expenditures were defined using the OECD's health accounts definition of public health as 'prevention and public health services' (i.e. category HC.6). This includes inter alia maternal and child health, school health and the prevention of communicable and non-communicable disease.

¹⁹The numbers here likely include only part of government health spending; the source given is the National Bureau of Statistics 2004 China Statistical Yearbook.

²⁰They make use of official and fieldwork data collected in the early 1990s in two provinces – Shandong, a prosperous coastal province, and Guizhou – and in selected counties in each province. In Penglai county (Shandong), nearly 90% of babies were delivered at a county hospital or township health center, which, the authors argue, helps explain the county's low infant mortality rate and maternal mortality ratio. In Zunyi county (one of Guizhou's better-off counties), less than half of all births took place at a county hospital or township health center, whereas in Puding county (one of Guizhou's poorer counties), most births occurred at home because the county hospital was too distant and the township health center too poorly equipped. West and Wong argue this helps explain why Guizhou's infant mortality rate is three times that of Shandong.

provided hard empirical evidence on the subject, and has also shed light on the impacts of the reforms to provider payment methods.

Liu and Mills (2003) examined the effects of bonuses on hospital revenues in 108 Chinese public hospitals. They found that following the introduction of a bonus system, and following a switch in bonus system from one with low-powered incentives to one with high-powered incentives, hospital revenues increased. High-powered incentives inevitably caused health workers to focus on delivering services where profit margins were highest – in China, given the price schedule, this means drugs and high-tech tests – even if the services are medically unnecessary. Yip (2009) reports that 75% of patients suffering from a common cold and 79% of hospital patients are prescribed antibiotics (the latter figure compares with an international average of 30%). Liu and Mills (1999) found that 20% of all expenditure associated with appendicitis and pneumonia treatment and as much as one-third of drug expenditures were considered to be unnecessary by a panel of reviewing physicians. The physician panel concluded that, for both appendicitis and pneumonia, length of stay (LOS) could be reduced by 10–15% without any adverse effects on health outcomes. Unnecessary care has also been documented in the treatment of TB patients. Some providers have delivered additional care beyond the services in the free DOTS package by treating patients for longer than the recommended 6 months, or by providing non-standard tests and medicines on top of those in the DOTS package; a local TB control manager unashamedly explained to the researchers that the DOTS strategy ‘has been locally adapted... to improve effectiveness and generate revenue’ (Zhan *et al.*, 2004). The other side of the coin is that patients often did not receive services that were medically necessary. Often some TB patients did not receive the interventions they were supposed to receive for free under the DOTS program (cf. Zhang *et al.*, 2007).²¹

Unsurprisingly, in view of the apparent link between misaligned incentives and health care costs, there were, as mentioned in Section 2, some attempts during this era to improve the incentive structure. The aforementioned drug price regulation reform of 2000 attempted to reduce the growth of drug expenditures which ran at 15% per year in real terms between 1990 and 2001 (Meng *et al.*, 2005). The reform was not, however, successful: expenditures grew just as rapidly after the reform as before, apparently because hospitals were able to shift to drugs whose prices were not controlled, or to increase drug use.

More successful were the attempts in some localities to move away from fee-for-service (FFS) within the urban insurance system toward a system of prospective payments built around more rational incentives. The literature evaluating these experiences was recently reviewed by Eggleston *et al.* (2008) in this journal. Many of the studies reviewed there do not use rigorous impact evaluation methods – many, for example, consist simply of before-and-after comparisons. There are, however, exceptions. Yip and Eggleston (2001) study the impact of Hainan Social Insurance Bureau's decision in the mid-1990s to introduce prospective payments in six hospitals. They found that, compared with a comparable set of hospitals that continued to be paid via FFS, these six hospitals saw slower rates of growth of expenditures and copayments per inpatient admission over the study period (1995–1997). In a companion paper, Yip and Eggleston (2004) found that Hainan's prepayment reform was also associated with a slower increase in spending on high-margin services (expensive drugs and high technology services) compared with FFS.

Some provider payment reforms were introduced in conjunction with other health system reforms, and evaluations have focused on the overall impact of the package. For example, Meng *et al.* (2004) report on a comparison between Nantong, an urban health insurance pilot city that implemented both

²¹Zhang *et al.* (2007) found that in 2003 less than 10% of suspected TB cases received a sputum test and only 4% were referred to a county TB dispensary, again presumably because providers were not rewarded sufficiently at the margin for providing such services.

provider payment reforms and new forms of contracting, and Zibo, a city that did not implement reforms. They found a smaller cost increase in Nantong, without measurable impact on quality.

4. CHINA'S HEALTH REFORMS SINCE 2002

China entered the new millennium with a health system that faced multiple challenges: a slowdown in health improvements; high rates of catastrophic out-of-pocket spending and impoverishment through health expenses; inequalities in health and health care utilization; limited financial protection even among those with insurance (a small minority of the population); inequalities in government spending driven partly by inequalities in fiscal capacity caused by the intergovernmental fiscal system; and rapidly rising health care costs fuelled in part by high-powered perverse incentives that encouraged the provision of costly (and often unnecessary) care at the expense of basic cost-effective care. The countermeasures taken during the 1990s appear to have pushed the system in the right direction, but the leadership that assumed power in 2002 quickly acknowledged that deeper reforms were required in the health sector as part of a push toward 'balanced development' and a more 'harmonious society'.

A series of measures have been introduced from 2003 onwards. The first was the New Rural Cooperative Medical Scheme (NRCMS), introduced between 2003 and 2008, and aimed at providing insurance to rural residents (see e.g. You and Kobayashi, 2009). NRCMS has several features that distinguish it from the old CMS: it is a voluntary program that covers only those who join; NRCMS is funded by enrollee contributions and by increasingly generous subsidies from central and local governments; NRCMS operates at the county rather than the commune level and hence has a much larger risk pool; finally, NRCMS focuses in most localities largely on the costs of inpatient care, whereas the old scheme focused on basic services that included personal and communal preventive interventions.²² The benefit package varies geographically, but a typical package involves a modest household MSA for outpatient expenses and an SPA for inpatient expenses with high deductibles. Both rates and ceilings for reimbursements have been low. Over time, however, as additional funding has gone into the program, coverage has become more generous.

A health insurance program for the 420 million urban residents not covered by BMI began to be introduced in 2007. A large-scale pilot of the new scheme (known as the Urban Resident Basic Medical Insurance scheme, or URBMI) was initially launched in 79 cities. In 2008, the government announced its intention to roll the program out in half of China's cities by the end of 2008, and to ultimately extend coverage to 100% of cities by 2010 (Cheng, 2008; Lin *et al.*, 2009). Target groups for the new scheme are children, the elderly, the disabled and other non-working urban residents. Enrollment in URBMI is voluntary but at the household level. The idea behind enrolling entire households is partly to reduce administrative costs, and partly to reduce adverse selection. Like NRCMS, the new urban scheme is financed largely by government premium subsidy with some household contributions. As of July 2008, 40.68 million people were enrolled in the scheme (Cheng, 2008).

A health expense safety-net program known as Medical Assistance was introduced between 2003 and 2007 to provide financial assistance with health care payments for poorest and most vulnerable in rural and urban areas, especially those covered by the Wu Bao, Te Kun and Di Bao social assistance programs (Wagstaff *et al.*, 2009b).²³

On the supply side of the health system, the government has tried to reduce the cost of health care by encouraging people to seek and receive treatment in lower-level facilities. It wishes to stop people from being admitted to hospital unnecessarily and from staying there longer than required. A government

²²In the 1990s, several commentators and researchers (cf. e.g. Liu *et al.*, 1996) were arguing for a subsidized voluntary community health insurance scheme to replace the largely defunct CMS. The designs of the programs proposed were quite modest compared with the NRCMS that emerged in 2003.

²³A similar program was piloted in the World Bank-financed Health VIII project in the late 1990s (Wagstaff and Yu, 2007).

directive came into effect in 2003, permitting BMI members to claim reimbursement for expenses incurred at community health centers (Pan *et al.*, 2008). At the time, however, community health centers were notorious for their poor service, and hence in 2005 the government announced its intention to create a network of new centers to provide high-quality preventive, primary and home care and rehabilitative services (Yip and Hsiao, 2008). Many of the new centers are rehabilitated old community health centers. Physicians at the new centers are being retrained to become general practitioners.

These measures are now being portrayed by China's government as building blocks in a more comprehensive health sector reform whose nature has only recently been revealed after a three-year consultation and drafting exercise. In 2006, a working group spanning 16 ministries was set up by the State Council. In 2007, the group listened to the ideas of a selected group of academics, international organizations and management consultants. In February 2008, the group completed its report. In October 2008, the public was invited to comment on the report for a one-month period. Over 30 000 comments were received. In January 2009, the State Council endorsed the report, but it was not until April 2009 that the revised report was made official. The key element of the report is the promise of affordable basic health care for everyone. Expanding insurance is one element to achieving this, as is improving the number and quality of lower-level facilities. Substantial government funds have been promised (\$US 125 billion over 3 years, all claimed to be additional), in part to rehabilitate and equip lower-level facilities, in part to finance the expansion of insurance coverage, and in part to increase supply-side subsidies to health facilities. The planned quid pro quo for extra supply-side subsidies is that facilities will be expected to focus their efforts on a defined set of interventions and medicines, for which they will not be able to charge patients; compliance by providers is to be achieved through closer supervision.

5. EARLY EVIDENCE ON CHINA'S RECENT HEALTH REFORMS

Unsurprisingly, given the sequencing of the reforms, there is little published evidence to date on the impacts of the more recent reforms – e.g. the new urban health insurance scheme and the new urban community health centers. Rather, the evidence to date concerns the two programs that started in 2003, namely the Medical Assistance safety net program, and the new rural health insurance scheme, NRCMS.

Wagstaff *et al.* (2009b) report that the Medical Assistance program is well targeted. The majority of the budget goes to those who prequalify by virtue of being covered by one of China's three major social assistance programs, and household survey data indicate that these households are disproportionately poor. However, the program's budget was initially quite small (it has since increased). Those covered by the three programs together account for just 5% of the population, leaving many households below the official poverty line eligible for Medical Assistance only if their expenses are deemed sufficiently large. The small budget is also reflected in low reimbursements to those who do qualify: enough at the time when the data were collected (2005) to cover the NRCMS household contribution and around RMB 1 toward out-of-pocket payments (this compares with an annual average out-of-pocket spending in rural areas of around RMB 130 (Wagstaff *et al.*, 2009b)).

More evidence is available on the new rural health insurance scheme, NRCMS. You and Kobayashi (2009) provide a review of the relatively few studies of the program published prior to March 30, 2008, as well as a summary of the institutional arrangements and variations therein across the country, and the changes that have been made to the program during its rollout.

Wagstaff *et al.* (2007) analyze the factors affecting enrollment in 10 of the first-wave NRCMS counties. They found that living far away from health facilities reduces the probability of a household enrolling, as does having one or more household members enrolled in one of the urban health insurance schemes. The authors found no evidence of enrollment varying monotonically with education or

income, but they do found evidence of adverse selection, despite enrollment being at household level and despite the government subsidies to the scheme. The authors found that the enrollment probability is increased by a high share of household members with chronic illnesses and by a high share of household members reporting their health as bad or fair (as compared with good or excellent).

The finding of adverse selection in the NRCMS is consistent with the results of Wang *et al.* (2008) who explored determinants of enrollment in NRCMS in rural Beijing. They found that having sick household members increases the likelihood of enrollment by more than 66%. Adverse selection was also found in a study by Wang *et al.* (2006) of enrollment patterns in an experimental Rural Mutual Health Care (RMHC) scheme set up by Harvard University around the same time as NRCMS but in counties that at the time had not rolled out NRCMS. This scheme, like the NRCMS, required household-level enrollment (though in practice this was not fully enforced) and was subsidized.²⁴ In a later study, Zhang and Wang (2008) found that adverse selection into the Harvard scheme persisted over time, though did not get any worse. Liu *et al.* (2008a) found that among people who joined the NRCMS scheme in Weihai it was those with worse health who were less satisfied with the program; they hypothesize that this may indicate that these people found the program's depth of coverage inadequate to their needs.

What of the impacts of NRCMS? One objective of China's government in setting up NRCMS was to improve financial protection by reducing the risk of especially large out-of-pocket payments. Sun *et al.* (2009) collected data after the introduction of NRCMS on households whose health spending was according to one of their three definitions 'catastrophic'. They then simulated what household spending would have been in the absence of reimbursement by the NRCMS, given the county's rules on deductibles, coinsurance rates, reimbursement ceilings, etc. They found that NRCMS reduced by just 8% the fraction of households spending more than 40% of their disposable income on health care – a reduction they consider to be 'modest'.

Yip and Hsiao (2009) also use simulation methods to compare the financial protection afforded by the NRCMS benefit package with that provided by the Harvard scheme's benefit package. The NRCMS scheme, as mentioned above, typically entails a household MSA for outpatient expenses, and an SPA for inpatient expenses, with deductibles and reimbursement ceilings. By contrast, the Harvard scheme covers both inpatient and outpatient expenses (including drugs), with no deductibles. Both have roughly the same revenue per enrollee: the Harvard scheme is able to break even by having lower reimbursement rates and ceilings. Yip and Hsiao compare each household's out-of-pocket spending under three sets of scenarios: the Harvard scheme is in operation; the government's NRCMS is in operation and neither scheme is in operation. In each case the utilization pattern is assumed to be unchanged from that observed in the data, which are collected from a Harvard scheme site. They found that the NRCMS scheme reduces the fraction falling below the dollar-a-day poverty line as a result of health expenses by 3–4%. By contrast, the Harvard scheme reduces impoverishment by 6–7%. They attribute the superior performance of the Harvard scheme to the fact that many become impoverished not because of inpatient expenses but because of outpatient expenses (including drugs), often in the treatment of chronic illnesses such as hypertension, arthritis, diabetes and asthma.

These two simulation studies assume away any behavioral responses associated with the acquisition of insurance, i.e. they assume that households do not use more services or use different types of provider as a result of having NRCMS coverage. Wagstaff *et al.* (2009a) analyze the impacts of NRCMS taking into account behavioral responses. They combine differences-in-differences with propensity score matching to compare changes in utilization and out-of-pocket spending over the period 2003–2005 (i.e. before and after the introduction the NRCMS) across two groups: NRCMS-enrolled households in 10 counties and households living in five counties where NRCMS had not at the time been rolled out.

²⁴There were a number of differences between the Harvard scheme and the NRCMS, including the level of risk-pooling, which in the case of the Harvard scheme was at the township, not the county, level.

They also analyze data over the same period from all THCs in 200 NRCMS counties and 1500 non-NRCMS counties – a total of 20 000 facilities. The results of the study suggest that, despite the fact that it had been in existence for a maximum of 2 years at the time of the follow-up survey, and despite its limited funding at this time (funds have increased in the last few years), NRCMS had appreciable short-run impacts on behavior. The program increased the likelihood of people seeking outpatient and inpatient care, as well as the volume of care provided. However, partly because of this increase in utilization and the apparently limited impact on the cost per visit, NRCMS did not appear to reduce out-of-pocket spending. The study found smaller impacts among the poor on the use of outpatient care at higher-level facilities but larger impacts among the poor on the use of outpatient care at lower-level facilities. Partly because of this, the upward pressure on household out-of-pocket spending was found to be less pronounced among the poor. NRCMS impacts were also found to vary across counties. The results from the supply-side data are broadly consistent with these results, suggesting that NRCMS had impacts on bed occupancy, staffing and capital investments, at least among township-level providers.

6. CONCLUSIONS

The reforms of the early-mid 2000s have clearly gone some way toward addressing the health system challenges that China faced as it entered the new millennium. Most obviously, universal health insurance within the next few years is now a realistic prospect as a result of the BMI being supplemented by the new rural and urban schemes. The government hopes that its increased subsidies to NRCMS will enable coverage to deepen as well as broaden, and will reduce the inequality in government spending between rural and urban areas, and between poorer areas and richer areas within China's large rural expanse. The government's hope is that the government-funded improvements in lower-level facilities and the increased government recurrent expenditures on these facilities will result in an improvement in quality, and more care being received at such facilities. It is hoped that these measures, coupled with the introduction of a basic package of interventions provided at low cost to patients, will reduce out-of-pocket spending, slow the rise in health care costs and reduce the provision of unnecessary care.

The research surveyed in this paper suggests some caution is in order before concluding that the hoped-for effects will be achieved. There is no evidence to date on the coverage and impacts of the new urban insurance scheme. It is unclear how the schemes will interact, in terms of coverage eligibility (migrant workers, for example, are sometimes eligible for coverage under NRCMS but might in some localities also be covered by the new urban scheme), and in terms of provider payments (providers will likely face different incentives depending on which of the three schemes a patient is insured with). The evidence on NRCMS and on the old urban schemes provide pause for thought regarding likely impacts; in particular, the studies suggest that without reforms on the supply-side that dramatically alter the incentives for all types of health care provider, broader and deeper insurance cover could translate into a more resource-intensive style of health care. Improving the quality of care at lower-level facilities ought to help, but it is not known how far quality will be improved and how sensitive demand may be to quality changes. More importantly, it is unclear whether the quid pro quo that the government is seeking (larger lump-sum budgets in exchange for adherence to a basic and affordable package of interventions) will be effective. Theory suggests it may not, since it fails to alter incentives at the margin – providers will be tempted to take the larger budget but to continue to look for ways to earn extra income at the margin.

The Harvard experiment sheds some light on this issue. In addition to a benefit package that provides first-dollar cover for outpatient and inpatient care, the Harvard experiment differs from the NRCMS in that it contains a variety of supply-side interventions aimed at improving the performance of village doctors. Incomes were delinked from drug dispensing, and were instead paid through a salary plus bonus, the latter based on selected health outcomes, the discharge of specific public health functions

such as immunization, the volume of services delivered, the appropriate use of drugs and the maintenance of patient records. In addition, village doctors were barred from purchasing drugs and instead received drugs from THCs, which purchased in bulk for the entire area. Finally, a list of essential drugs was also introduced. The impacts of the experiment (analyzed using controls from sites where no insurance program was operating and where doctors were paid on a FFS basis) indicate that use of outpatient services increased, self-medication decreased, the share of households with catastrophic health spending declined and self-reported health improved (Wang *et al.*, 2009; Yip *et al.*, 2009). What is not clear from these two studies is how far the contemporaneous supply-side reforms were responsible rather than the demand-side measures.

In the light of the research reviewed in this article, and the ongoing debate about how best to reform China's health system, three concluding points would seem worth making. First, the recent research has enhanced our understanding of the system prior to 2003, in some cases reinforcing views (e.g. the evidence on demand-inducement associated with perverse incentives) while in other cases suggesting a slightly less clear storyline (e.g. the role of insurance). Second, the research to date points to the importance of careful evaluation of the reforms that are being currently rolled out, and to the potential for policy modifications as the rollout proceeds. The NRCMS provides a good example: the early evidence suggested limited impacts, and as the scheme was rolled out a variety of modifications were made that likely increased the scheme's impacts.

Finally, the research on the pre-2003 system suggests that while the recently announced further reforms are a step in the right direction, the hoped-for improvements in China's health system will be far more likely to occur if the reforms become less timid in two key areas: provider payments, and geographic inequalities in government health spending.²⁵ The scope for provider payment reform will increase as insurance coverage widens, but it will require a shift from reimbursement insurance to a contractual model where insurers pay providers and copayments become set on a per case basis rather than a fee-per-item-of-service basis. Thought will also need to be given to the role of government in setting prices for drugs and procedures not covered by insurance; there is a case for the government continuing to set prices, but reducing the margins providers can earn on them, thereby eliminating the incentive for providers to shift demand from covered to uncovered services. As far as geographic inequalities in government spending are concerned, as the central government has shown in recent years through its increasingly generous earmarked transfers to provincial governments for NRCMS, there is scope within the health sector to reduce geographic inequalities in government health spending even in a country that remains highly decentralized fiscally. More generous earmarked transfers for public health programs with tighter conditions are an obvious next step, as is a mechanism for facilitating transfers between cities within the BMI insurance system.

ACKNOWLEDGEMENTS

The authors thank Alan Maynard for comments on an earlier version of this paper. The findings, interpretations and conclusions expressed and any errors are entirely theirs; the views expressed do not necessarily represent those of the World Bank, its Executive Directors, or the countries they represent.

²⁵The government does, in fact, seem to realize the first of these is crucial, as Tsung-Mei Cheng's 2008 conversation with the minister shows (Cheng, 2008). The issue seems to be one of the political economy – how to implement payment reforms with a medical profession that has grown accustomed to high-powered incentives and little oversight.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

REFERENCES

- Akin JS, Dow WH, Lance PM. 2004. Did the distribution of health insurance in China continue to grow less equitable in the nineties? Results from a longitudinal survey. *Social Science & Medicine* **58**(2): 293–304.
- Banister J, Hill K. 2004. Mortality in China 1964–2000. *Population Studies (Camb)* **58**(1): 55–75.
- Blumenthal D, Hsiao W. 2005. Privatization and its discontents – The evolving Chinese health care system. *New England Journal of Medicine* **353**(11): 1165–1170.
- Bogg L, Dong H, Wang K, Cai W, Vinod D. 1996. The cost of coverage: rural health insurance in China. *Health Policy Plan* **11**(3): 238–252.
- Cai F, Park A, Zhao Y. 2008. The Chinese labor market in the reform era. In *China's Great Economic Transformation*, Brandt L, Rawski TG (eds). Cambridge University Press: New York; 167–214.
- Cai W, Zhuang Y, Marks JS, Chen CHC, Morris L, Harris JR. 1998. Increased cesarean section rates and emerging patterns of health insurance in Shanghai, China. *American Journal of Public Health* **88**(5): 777–780.
- Carrin G, Ron A, Yang H, Wang H, Zhang T, Zhaing L, Zhang S, Ye Y, Chen J, Jiang Q, Zhang Z, Yu J, Li X. 1999. The Reform of the Rural Cooperative Medical System in the Peoples Republic of China: interim experience in 14 pilot counties. *Social Science & Medicine* **48**(7): 961–972.
- Chen S, Ravallion M. 2008. *The Developing World is Poorer than We Thought, But No Less Successful in the Fight Against Poverty*. The World Bank: Washington, DC. Policy Research Working Paper 4703.
- Cheng T-M. 2008. China's latest health reforms: a conversation with Chinese health minister Chen Zhu. Interview by Tsung-Mei Cheng. *Health Affairs (Millwood)* **27**(4): 1103–1110.
- Cretin S, Duan N, Williams AP, Gu X, Shi Y. 1990. Modeling the effect of insurance on health expenditures in the People's Republic of China. *Health Services Research* **25**(4): 667–685.
- Dummer TJ, Cook IG. 2008. Health in China and India: a cross-country comparison in a context of rapid globalisation. *Social Science & Medicine* **67**(4): 590–605.
- Eggleston K, Ling Li, Meng Q, Lindelow M, Wagstaff A. 2008. Health service delivery in China: a literature review. *Health Economics* **17**(2): 149–165.
- Gao J, Raven JH, Tang S. 2007. Hospitalisation among the elderly in urban China. *Health Policy* **84**(2–3): 210–219.
- Gao J, Tang S, Tolhurst R, Rao K. 2001. Changing access to health services in urban China: implications for equity. *Health Policy and Planning* **16**(3): 302–312.
- Henderson GE, Akin J, Hutchinson PM, Jin SG, Wang JM, Dietrich J, Mao LM. 1998. Trends in health services utilization in eight provinces in China, 1989–1993. *Social Science & Medicine* **47**(12): 1957–1971.
- Hsiao WC. 1984. Transformation of health in China. *New England Journal of Medicine* **310**: 932–936.
- Hsiao WC. 1995. The Chinese health care system: lessons for other nations. *Social Science & Medicine* **41**(8): 1047–1055.
- Hu T, Ong M, Lin Z, Li E. 1999. The effects of economic reform on health insurance and the financial burden for urban workers in China. *Health Economics* **8**(4): 309–321.
- Koblinsky MA. 2003. *Reducing Maternal Mortality: Learning from Bolivia, China, Egypt, Honduras, Indonesia, Jamaica, and Zimbabwe*. World Bank: Washington, DC.
- Leung GM, Wagstaff A, Lindelow M, Lu JR. 2007. The health systems of China, Hong Kong and Taiwan. In *Encyclopedia of Public Health*, Heggenhougen K (ed.). Academic Press, North-Holland: Amsterdam.
- Lin W, Liu GG, Chen G. 2009. The Urban Resident Basic Medical Insurance: a landmark reform towards universal coverage in China. *Health Economics* **18**(S2): S83–S96.
- Liu GG, Zhao Z. 2006. Urban employee health insurance reform and the impact on out-of-pocket payment in China. *The International Journal of Health Planning and Management* **21**(3): 211–228.
- Liu J, Xu L, Cao X, Wang X, Sun H, Tang C, Yang Z, Song X, Lv M. 2008a. Analysis of satisfaction about new cooperative medical scheme and its influencing factors in Weihai, China. *Health Policy* **86**(2–3): 239–244.
- Liu X, Hsiao WC. 1995. The cost escalation of social health insurance plans in China: its implication for public policy. *Social Science & Medicine* **41**(8): 1095–1101.
- Liu X, Mills A. 1999. Evaluating payment mechanisms: how can we measure unnecessary care? *Health Policy and Planning* **14**(4): 409–413.

- Liu X, Mills A. 2003. The influence of bonus payments to doctors on hospital revenue: results of a quasi-experimental study. *Applied Health Economics and Health Policy* **22**: 91–98.
- Liu Y. 2002. Reforming China's urban health insurance system. *Health Policy* **60**(2): 133–150.
- Liu Y, Hsiao W, Eggleston K. 1999. Equity in health and health care: the Chinese experience. *Social Science & Medicine* **49**(10): 1349–1356.
- Liu Y, Hu S, Fu W, Hsiao W. 1996. Is community financing necessary and feasible for rural China? *Health Policy* **38**(3): 155–171.
- Liu Y, Rao K, Hsiao WC. 2003. Medical expenditure and rural impoverishment in China. *Journal of Health Population & Nutrition* **21**(3): 216–222.
- Liu YL. 2004. Development of the rural health insurance system in China. *Health Policy and Planning* **19**(3): 159–165.
- Liu Y, Rao K, Wu J, Gakidou E. 2008b. China's health system performance. *Lancet* **372**(9653): 1914–1923.
- Ma J, Lu M, Quan H. 2008. From a national, centrally planned health system to a system based on the market: lessons from China. *Health Affairs (Millwood)* **27**(4): 937–948.
- Martinez-Vazquez J, Qiao B, Wang S. 2008. Expenditure assignments in China: challenges and policy options. In *Public Finance in China: Reform and Growth for a Harmonious Society*, Zou H-F, Lou J (eds). World Bank: Washington, DC; 77–94.
- Meng QY, Cheng G, Silver L, Sun XJ, Rehnberg C, Tomson G. 2005. The impact of China's retail drug price control policy on hospital expenditures: a case study in two Shandong hospitals. *Health Policy and Planning* **20**(3): 185–196.
- Meng QY, Rehnberg C, Zhuang N, Bian Y, Tomson G, Tang SL. 2004. The impact of urban health insurance reform on hospital charges: a case study from two cities in China. *Health Policy* **68**(2): 197–209.
- O'Donnell O, van Doorslaer E, Rannan-Eliya RP, Somanathan A, Adhikari SR, Harbianto D, Garg CG, Hanvoravongchai P, Huq MN, Karan A, Leung GM, Ng C-W, Pande BR, Tin K, Trisnantoro L, Vasavid C, Zhang Y, Zhao Y. 2007. The incidence of public spending on healthcare: comparative evidence from Asia. *World Bank Economic Review* **21**: 93–123.
- Pan X, Dib HH, Zhu M, Zhang Y, Fan Y. 2008. Absence of appropriate hospitalization cost control for patients with medical insurance: a comparative analysis study. *Health Economics*. DOI: 10.1002/hec.1421.
- Park A, Rozelle S, Wong C, Ren C. 1996. Distributional consequences of reforming local public finance in China. *The China Quarterly* (147): 751–778.
- Shah A, Shen C. 2008. Fine-tuning the intergovernmental transfer system to create a harmonious society and a level playing field for regional development. In *Public Finance in China: Reform and Growth for a Harmonious Society*, Lou J, Wang S (eds). World Bank: Washington, DC; 129–154.
- Sun X, Jackson S, Carmichael G, Sleigh AC. 2009. Catastrophic medical payment and financial protection in rural China: evidence from the New Cooperative Medical Scheme in Shandong Province. *Health Economics* **18**(1): 103–119.
- Tang L. 2000. Progress in malaria control in China. *Chinese Medical Journal (Engl)* **113**(1): 89–92.
- Ter-Minassian T, Fedelino A. 2008. Fiscal policy and reforms: toward realizing a harmonious society. In *Public Finance in China: Reform and Growth for a Harmonious Society*, Lou J, Wang S. World Bank: Washington, DC; 53–74.
- Van Doorslaer E, O'Donnell O, Rannan-Eliya RP, Somanathan A, Adhikari SR, Garg CC, Harbianto D, Herrin AN, Huq MN, Ibragimova S, Karan A, Lee T-j, Leung GM, Lu J-fR, Ng CW, Pande BR, Racelis R, Tao S, Tin K, Tisayaticom K, Trisnantoro L, Visasvid C, Zhao Y. 2007. Catastrophic payments for health care in Asia. *Health Economics* **16**: 1159–1184.
- Van Doorslaer E, O'Donnell O, Rannan-Eliya RP, Somanathan A, Adhikari SR, Garg CC, Harbianto D, Herrin AN, Huq MN, Ibragimova S, Karan A, Ng CW, Pande BR, Racelis R, Tao S, Tin K, Tisayaticom K, Trisnantoro L, Vasavid C, Zhao Y. 2006. Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data. *Lancet* **368**(9544): 1357–1364.
- Wagstaff A, Lindelow M. 2008. Can insurance increase financial risk? The curious case of health insurance in China. *Journal of Health Economics* **27**(4): 990–1005.
- Wagstaff A, Lindelow M, Gao J, Xu L, Qian J. 2007. *Extending Health Insurance to the Rural Population: An Impact Evaluation of China's New Cooperative Medical Scheme*. World Bank; Washington, DC. Impact Evaluation Series 12. Policy Research Working Paper WPS 4150.
- Wagstaff A, Lindelow M, Jun G, Ling X, Juncheng Q. 2009a. Extending health insurance to the rural population: an impact evaluation of China's new cooperative medical scheme. *Journal of Health Economics* **28**(1): 1–19.
- Wagstaff A, Lindelow M, Wang S, Zhang S. 2009b. *Reforming China's Rural Health System*. World Bank: Washington, DC.

- Wagstaff A, Yu SC. 2007. Do health sector reforms have their intended impacts? The World Bank's Health VIII project in Gansu province, China. *Journal of Health Economics* **26**(3): 505–535.
- Wang H, Gu D, Dupre ME. 2008. Factors associated with enrollment, satisfaction, and sustainability of the New Cooperative Medical Scheme program in six study areas in rural Beijing. *Health Policy* **85**(1): 32–44.
- Wang H, Huang G. 2000. Assessing the reform models of China's urban health insurance system. *Chinese Health Policy* 9–11.
- Wang H, Yip W, Zhang L, Hsiao W. 2009. The impact of Rural Mutual Health Care on health status: evaluation of a social experiment in rural China. *Health Economics* **18**(S2): S65–S82.
- Wang H, Zhang L, Yip W, Hsiao W. 2006. Adverse selection in a voluntary Rural Mutual Health Care health insurance scheme in China. *Social Science & Medicine* **63**(5): 1236–1245.
- West LA, Wong CPW. 1995. Fiscal decentralization and growing regional disparities in rural China: some evidence in the provision of social services. *Oxford Review of Economic Policy* **11**(4): 70–84.
- Wong CCP, Bird RM. 2008. China's fiscal system: a work in progress. In *China's Great Economic Transformation*, Loren B, Thomas GR (ed.). Cambridge University Press: Cambridge; 429–466.
- Xueshan F, Shenglan T, Bloom G, Segall M, Xingyuan G. 1995. Cooperative medical schemes in contemporary rural China. *Social Science & Medicine* **41**(8): 1111–1118.
- Yi Y, Maynard A, Liu G, Xiong X, Lin F. 2005. Equity in health care financing: evaluation of the current urban health insurance reform in China. *Journal of the Asia Pacific Economy* **10**(4): 506–527.
- Yip W. 2009. Disparities in health care and health status: the rural-urban gap and beyond. In *One Country, Two Societies: Rural-Urban Inequality in Contemporary China*, Whyte M (ed.). Harvard University Press: Cambridge, MA.
- Yip W, Eggleston K. 2001. Provider payment reform in China: the case of hospital reimbursement in Hainan Province. *Health Economics* **10**(4): 325–339.
- Yip W, Eggleston K. 2004. Addressing government and market failures with payment incentives: Hospital reimbursement reform in Hainan, China. *Social Science & Medicine* **58**: 267–277.
- Yip W, Hsiao W. 1997. Medical savings accounts: lessons from China. *Health Affairs* **16**(6): 244–251.
- Yip W, Hsiao WC. 2008. The Chinese health system at a crossroads. *Health Affairs (Millwood)* **27**(2): 460–468.
- Yip W, Hsiao WC. 2009. Non-evidence-based policy: how effective is China's new cooperative medical scheme in reducing medical impoverishment? *Social Science & Medicine* **68**(2): 201–209.
- Yip W, Wang H, Hsiao W. 2009. The impact of rural mutual health care on access to care: evaluation of a social experiment in rural China. *Mimeo*.
- You X, Kobayashi Y. 2009. The new cooperative medical scheme in China. *Health Policy* **91**: 1–9.
- Zhan S, Wang L, Yin A, Blas E. 2004. Revenue-driven TB control – three cases in China. *International Journal of Health Planning and Management* **19**: 63–78.
- Zhang J. 2007. A DID analysis of the impact of health insurance reform in the city of Hangzhou. *Health Economics* **16**(12): 1389–1402.
- Zhang L, Wang H. 2008. Dynamic process of adverse selection: evidence from a subsidized community-based health insurance in rural China. *Social Science Medicine* **67**(7): 1173–1182.
- Zhang T, Tang S, Jun G, Whitehead M. 2007. Persistent problems of access to appropriate, affordable TB services in rural China: experiences of different socio-economic groups. *BMC Public Health* **7**: 19.
- Zhang X, Kanbur R. 2005. Spatial inequality in education and health care in China. *China Economic Review* **16**: 189–204.
- Zheng X, Hiller S. 1995. The reforms of the Chinese health care system: county level changes: the Jiangxi study. *Social Science & Medicine* **41**(8): 1057–1064.
- Zhou B, Yang L, Sun Q, Gu H, Wang B. 2008. Social health insurance and drug spending among cancer inpatients in China. *Health Affairs (Millwood)* **27**(4): 1020–1027.