WPS5530

Policy Research Working Paper 5530

Equity and Public Governance in Health System Reform

Challenges and Opportunities for China

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The World Bank
East Asia and Pacific Region
Human Development
and Poverty Reduction and Economic Management Departments
January 2011

Policy Research Working Paper 5530

Abstract

Achieving the objective of China's current health system reform, namely equitable improvements in health outcomes, will be difficult not least because of the continuously growing income disparities in the country. The analysis in this paper shows that since 2000, disparity in selected health outcomes has been declining across provinces, largely due to earmarked central government allocations. By contrast, public expenditure on health is increasingly regressive (positively correlated with local income per capita) across provinces, and across prefectures and lower levels within provinces. The increasing inequity in public expenditure at sub-national levels indicates that incentives, responsibilities, and resources at sub-national levels are not well aligned with China's national priorities. To address the weaknesses in equity and efficiency that characterize China's health system and health outcomes, China's health system reform may require complementary reforms to improve governance for public service delivery across sectors.

This paper is a joint product of Human Development and Poverty Reduction and Economic Management Departments in the East Asia and Pacific Region. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at hbrixi@worldbank.org.

Equity and public governance in health system reform: Challenges and opportunities for China

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Authors' contribution

Hana Brixi designed and led the analysis. Mu Yan contributed to the study design and analysis. Hana Brixi, Mu Yan and Beatrice Targa conducted the systematic review of the available literature and evidence, extracted the available data from the original statistics sources, conducted the analysis, and drafted the paper.

David Hipgrave contributed to the structure and content of the final text of the manuscript.

All authors provided important intellectual and material input at different stages of the work and contributed to drafting the paper.

The corresponding author (Hana Brixi) had full access to all the data in the manuscript and had final responsibility for the decision to submit for publication.

The authors thank Jennifer Fong for research support, John Langenbrunner for valuable comments, and participants in seminars organized by the National Development and Reform Commission, Ministry of Health and UNICEF in China for feedback.

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1. Introduction

In early 2009, China's Ministry of Health (MoH) announced a comprehensive set of health system reforms (HSR) designed to rectify the widely acknowledged and increasing inequity that characterized China's health services. (1) China's HSR started formally in 2006, after President Hu Jintao demanded universal access to quality basic healthcare and better health outcomes for the Chinese people, followed by an open apology for problems of affordability and accessibility to the health sector by then Vice Premier Madam Wu Yi. The State Council established a 16-ministry leading group for, and opened an unprecedented public debate on the issues and proposals for HSR, with wide participation of citizens as well as the domestic and international expert community. The reforms aim to provide "safe, effective, convenient and affordable" healthcare to all urban and rural residents through five main pillars: strengthening public health functions and services, enhancing primary care delivery, establishing universal basic health security (insurance), ensuring the safety of and access to essential medicines, and optimizing the management of public hospitals. (2)

Inequity in China's health sector has been driven by the comparatively low level of government funding, averaging only 0.7-0.9% of gross domestic products (GDP) compared to about 2% in comparable middle-income countries. Out of pocket spending as a proportion of total health expenditure before the reforms was around 60%. (3) Recognizing that China's HSR required an increased financing commitment, in March 2009 Premier Wen Jiabao announced at the 11th National People's Congress an RMB 850 billion allocation (2.8% of 2008 GDP) to support HSR during 2009 - 2011 (4), and government expenditure on health increased to 1.4% of GDP in 2009. (5) This is still low compared to government expenditure on education (3.5% of GDP in 2008) (6), but brings China closer to a WHO estimate that government spending on health of 1.5-2.0% of GDP could guarantee primary health care (public health and a modest package of essential clinical care) for all in China. (7)

The announcement of the priorities for and content of the reforms by national government, along with the expectation of their implementation at all administrative levels, has placed a great burden on provincial and sub-provincial health authorities. Moreover, ensuring that the concomitant injection of new fiscal resources contributes effectively to the accomplishment of HSR objectives is a challenge, since about 90 percent of public resources for health care (as well as other public services) is generally allocated at the provincial and sub-provincial levels. (8) Promoting allocative and operational efficiency in public expenditure at these levels is a particular challenge that has yet to receive appropriate attention nation-wide.

In this paper, we explore whether the government's actual expenditure on health across levels support China's HSR objectives. We analyze the available national, provincial and sub-provincial statistics to explore recent trends in relation to equity in certain key health outcomes and public

resource allocations in China. In particular, we study to what extent public resource allocations have remained correlated with the local GDP per capita, and how and why local health outcomes have changed in this context. We also include information on governance issues pertaining to health sector funding allocations, and conclude with our perspectives on how China's HSR provides an opportunity for improving governance in public sector financing in and beyond the health sector.

2. Disparity in health resource allocation across administrative levels

Burgeoning inequity despite national government initiatives

Health financing in China is decentralized across five levels of government (Figure 1) and the public contribution is largely determined by local fiscal capacity. (9) Local governments, namely the lowest two out of the five tiers of government, bear the main responsibility for financing essential public services and their fiscal capacity differs widely across China even after adjusting for equalization transfers, which are formula-based grants by central government according to measures of expenditure needs and fiscal capacity cross localities.

The extent of inequality in public spending on health per capita across provinces has risen since 2001 (figures 2 and 2A). This is also true in other areas of public services, such as education in the period 2000-2008 (figure 3).

Another source of burgeoning inequity is that total health spending per capita within provinces is increasingly skewed toward urban areas (figure 4), where household income is higher.

Within provinces and also within prefectures, evidence suggests that inequity in spending on health is also rising. Examples of rising disparity across prefectures in Inner Mongolia and Shandong and across district levels in Jinan and Zhengzhou municipalities are shown in figures 5 – 6. (Annex A provides descriptive statistics. Graphs in Annex figures A1 – A3 show similar inequity in health spending at sub-national level.) A similar situation appears in government expenditure on education at both prefecture and sub-prefecture levels (Annex A figure A4).

At household level, the availability of public resources for health also differs across population groups according to their participation under the different health security schemes available in China. Figure 7 shows that since 2002, whilst China has introduced several major new schemes to benefit previously excluded population groups and make the allocation of public resources more equitable, the size of the allocations per capita is, as yet, far from equal. Similarly, in other social sectors, including old-age pensions and education, China has been introducing programs to target the poor trying to overcome the overall bias toward better off population groups. (10)

Finally, catastrophic and out-of-pocket health expenditures continue to demonstrate considerable inequity in China. During 2003-08, as National Health Service Survey reports (11) show, incidence of catastrophic health spending among low-income households remained about 10 percent in rural areas and increased from 4 to 6 percent in urban areas (figure 8). Average out-of-pocket payment (after insurance reimbursement) for a single inpatient stay in 2008 was 50-70% of annual income per capita in rural areas, about twice the levels common in urban areas (figure 9). Moreover, to some extent, the funding increases for rural health care through the restored

rural cooperative medical scheme (RCMS) and specifically through subsidies for hospital delivery may have been associated with cost inflation, limiting the reduction in absolute out-of-pocket payments per intervention (figure 10 showing the development in cost and out-of-pocket expenditures per hospital delivery in absolute terms – on left axis – and as a share of annual income per capita – on right axis -- by urban and rural typology).

Some inequities are closely related to the existing inefficiencies

Since the early 1980s, China's public resources have facilitated rapid improvements in availability of advanced care in specialized urban hospitals. As public resources are biased toward higher-level facilities, they disproportionately benefit higher-income households. (12) A similar bias in the allocation of public resources toward higher-level facilities and higher-income population groups is also seen in the education sector, where "key schools" at each level benefit from higher levels of public funding, and are more easily accessed by the children of the higher income households.

In China's cities, advanced care is available at levels comparable with advanced economies (for example, the availability of advanced technologies per person in large Chinese cities matches the levels in most OECD countries since the mid- to late-1990s (13) and various life-cycle indicators match or exceed those of the developed world). Beijing and Shanghai, for instance, report prevalence of magnetic resonance imaging machines and other advanced medical equipment – funded partially by public resources – exceeding levels common in European cities. (14) Primary care in urban areas, however, has been unnecessarily expensive, often delivered by hospitals and specialized doctors instead of health centers and general practitioners with qualified nurses. (12)

By contrast, the fraction of public resources that benefits rural (township) health centers is disproportionately small (figure 11), while poor quality of care, over-servicing and irrational use of drugs remain serious problems there, as well as in urban areas. (1) Poor rural households still face financial obstacles in accessing cheap effective care (such as management of newborn and respiratory illnesses that remain common causes of young child mortality). A government-UN review in 2006 found that during 2000-2004, preventable conditions accounted for about 70% of neonatal deaths, particularly in poor rural areas. (15) A more recent Lancet review of under-five deaths in China (16) also infers that a majority of these would be preventable with interventions that are commonly available and cheap to provide. For China's HSR, inefficiency and inequity in the distribution of financial, human and physical resources (17) (18) are an area of focus.

China's HSR framework includes many appropriate elements to promote cost-effectiveness and overall operational efficiency in public resource allocation in health. Efforts to allow cost-recovery in primary care, implement the list of essential medicines, reduce the dependence on service fees in provider payment mechanisms, strengthen health centers and enhance the management of public hospitals are all included.

The bias toward advanced care, however, continues to surface in the process of HSR implementation at the local level. The detailed design and implementation of most of the social protection schemes in health, including the RCMS, Medical Financial Assistance (MFA) and Urban Residents' Basic Medical Insurance (URBMI), occurs at county/district level, and for the most part excludes outpatient care. Research in 2008 estimates that only 15% of counties cover

outpatient as well as inpatient care in their RCMS schemes (19), generating incentives to providers to admit patients for ailments that could be treated more cheaply at home.

Out-of-pocket payments as a share of medical bills remain significantly higher for outpatient care compared to inpatient care in both urban and rural areas. The most recent National Health Services Survey (NHSS) (11) shows that in 2008, 33% of patients received partial reimbursement for outpatient care compared to 85% who received partial reimbursement (in the average amount of 35% of the medical bills) for inpatient care. This is confirmed by field research. Citizens' scorecard survey shows that out-of-pocket payments as a share of medical bills remain significantly higher for outpatient care compared to inpatient care, and reach 84% of *monthly* per capita income among patients in the poorest quintile (compared to about 11% in the richest quintile) for an average outpatient visit, and a staggering 140% of *annual* per capita income in the poorest quintile (compared to about 10% in the richest quintile) for a single average hospitalization episode. (20)

Earmarking of vertical programs to promote equity may also be failing in some areas
To implement national priorities, the central government has been circumventing the problem of resource allocation at local level by increasingly relying on vertical programs and earmarked specific purpose transfers (that are conditional, to incentivize sub-national governments, as opposed to general-purpose transfers that are unconditional to provide general budget support). As part of China's HSR, six new public health initiatives (for hepatitis B vaccination of older children, folic acid supplementation, fluorosis prevention, cervical and breast cancer screening for rural women, cataract treatment, and rural water and sanitation initiatives) have been recently added to the hundreds of earmarked transfers already in existence in the health sector. Currently, the entire central government budget for the health sector consists of earmarked transfers (accounting for RMB 112 billion in 2009). Central government spending on health does not include any general-purpose transfers to benefit poorer localities. Although there are over one hundred earmarked transfers in the area of public health alone, their total allocation is relatively small compared to the overall inequities in public resource allocation on health between urban and rural areas, and between wealthy and poor, and eastern and western provinces. (21)

In some areas of social sector spending, such as the programs to reduce maternal mortality and support 9-years of compulsory education, earmarked transfers have supported measurable improvements in outcomes. Figure 12 demonstrates a marked reduction in the ratio of maternal mortality in rural versus urban areas, from 2.6 in 1991 to 1.3 in 2009, with most of the reduction occurring since 2002 when subsidies for hospital delivery jumped up in poor rural areas. Earmarked transfers for basic compulsory education, complemented by close monitoring of student enrolments, have helped strengthen basic education across China. Similarly, earmarked transfers and intensive real-time monitoring have facilitated successful roll-out of the *dibao* cash transfer scheme nation-wide.

The reliance on earmarked transfers for such programs, however, results in concerns about the sustainability of any observed improvements and the predictability of funding at the local level. Furthermore, the selection of programs for earmarked transfers may depend on sectoral agencies' or local governments' lobbying ability rather than to a rigorous assessment of needs. Moreover, local studies have revealed weaknesses in monitoring and, in some instances, low compliance in

the use of earmarked transfers. For instance, county governments may offset earmarked transfers by cutting operating budget or raising staff numbers for the transfer recipient agencies. (22)

Finally, although vertical programs and earmarked transfers may help deliver results in specific areas they are not an appropriate financing strategy for effective HSR implementation. The large number of vertically-funded health interventions and the associated problems of monitoring suggest that it would be impossible to achieve the HSR's management-strengthening components and develop China's proposed universal primary health care system as a sum of vertical programs.

3. Socio-economic and health outcome disparities and decentralization in China

Decentralization and China's economic development

Achieving equitable improvements in health outcomes is challenging in any country. It is especially challenging in the context of China's large and growing disparities in economic development and incomes across localities and population groups. (23)

Decentralization and competition among localities has played a role in the success of China's economic development over the past 30 years. (24) (25) Local governments' ability to experiment and adapt the implementation of national policies has promoted local economic performance and helped the central government gradually enhance national policies.

Decentralization and competition among local governments, however, have also contributed to the growing disparities across China. Growing income disparities have arisen across localities and population groups, often within local jurisdictions. (26) (27). Along with income disparities, disparities in human development indicators, such as child mortality rates, are significant across China, and are partly driven by inequities in access to essential public services. (28)

Central government initiatives to resolve disparities in social outcomes

Over the past decade, the Government of China has adopted a range of policies to reverse the trend of rising disparities with good results on several fronts. Broad economic development strategies, such as *Going West to support the development of 12 Western provinces* (launched at the National People's Congress in 2000) have helped to contain the income disparities *between the coastal and inland* provinces and facilitated overall improvements in selected inland provinces.

With respect to human development outcomes, earmarked transfers from the central government budget have supported programs to reduce inter-provincial and rural-urban disparity particularly in the maternal mortality ratio (MMR), and to a lesser extent also infant and under-five mortality rates (U5MR) (rural:urban disparity in the latter has also fallen by around 20% in the last decade). These earmarked transfers are of three main types:

a) targeted vertical schemes, such as for nine-years of compulsory education, hospital delivery subsidies for rural women (29) now in all 2297 rural counties, improvements to the Expanded Program on Immunization, the six public health programs listed earlier and most recently the 15 yuan per capita essential public health payment – again implemented by county health authorities

according to local priority;
b) social protection payments, such as the RCMS, URBMI, the MFA and social assistance *dibao* cash transfers for the rural poor, and
c) infrastructure investments, such as construction of health facilities, improvement of drinking water sources, sanitation, and rural access roads.

These earmarked transfers may have contributed to some of the reduction in disparity in selected outcomes across provinces and across the rural and urban areas nationally. The remaining inequities in health outcomes, however, have multiple roots, including social determinants, underfunding of primary care, wide-spread incentive distortions among the providers of care and financing and design weaknesses in the RCMS and MFA. (30) (31) (32) (33) (34)

Comparisons in health outcomes across provinces
Disparity in health indicators in relation to income per capita across China's provinces is of a similar magnitude to that observed across countries, revealing the large scope for the equalizing role of government. The MMR, U5MR and IMR, for example, while on average lower in China's provinces than in countries with a comparable GDP per capita, are as closely related to the provincial GDP per capita in China as the levels across countries are to the national GDP per capita world-wide (figures 13, 13A and 13B).

Across China's provinces, disparities in maternal and child health outcomes have matched income disparities, but the correlation progressively weakened during 2000-2008 (see Annex Figure B1 for annual figures), suggesting that government initiatives to reduce inequity even before the HSR, supported by technical interventions to improve service content and quality and human resource capacity, were proving effective (figures 14, 14A and 14B).

Further, although rural-urban household income disparities nation-wide grew in the last decade, rural-urban disparities in maternal and to a lesser extent infant and child mortality have declined, again predominantly over the last decade (figure 15).

Comparisons within provinces
Socio-economic disparities within provinces have also worsened. (35) Since 2000, all but four western provinces (Sichuan, Tibet, Xinjiang and Yunnan) registered a continuously rising ratio of urban per capita annual disposable household income to net rural household income (the ratio between per capita annual disposable income for urban households and per capita annual net income for rural households) (Annex Table B1), which in some provinces reached 4:1 compared to the national ratio of 3.3:1 in 2009. (8)

With respect to health indicators, some provinces have achieved equitable improvements. Inner Mongolia (one of the few provinces for which prefecture data are readily available), for instance, has reduced infant mortality faster in poorer prefectures (figure 16). However, intra-province disparity in health outcomes remains high between and within rural and urban areas respectively, (figure 17, Annex figures B2 and B3 and Annex tables B2-B3). The infant mortality rate in the best and worst districts/counties differed 10-fold in Chengdu (36) municipality and 12-fold across prefectures in Gansu (37) province, both in 2007.

In conclusion, the improvements in equity in rural versus urban maternal and child mortality in China over the last decade appear linked to national initiatives in health security funding, hospital delivery subsidies and possibly infrastructure improvements and training of staff. We do not have evidence to suggest comparable improvements in mortality equity within provinces, but the decreasing equity in health funding allocations and persisting inequity in out-of-pocket payments and per capita allocations would infer the opposite.

4. The influence of public sector governance weaknesses on HSR implementation

The weaknesses in equity and efficiency in public expenditure on health and other social services may be partly explained by weak incentive structures in the provincial and sub-provincial governments. Efficiency and particularly equity in public resource allocation have not been influential performance indicators for governments and service providers at sub-national levels. (38) Local government officials are not accountable for equity in local health outcomes and for equity and efficiency in public resource allocation. In this respect, health differs from education, where the achievement of universal 9-year compulsory education is subject to strict monitoring and performance evaluation at the local levels.

Introducing equity in health outcomes and public resource allocation at sub-national level has also been a challenge also in the development of the monitoring and evaluation framework for HSR implementation. As a result, provincial and sub-provincial governments may not have the incentives or capacity to comply with China's HSR objectives. (39) (20)

Surveys (39) (20) and insights offered by government officials interviewed for this analysis suggest that provincial, prefecture and municipal governments may partly withhold public resources originally targeted to counties, townships and villages in need. In particular, interviews have confirmed that beyond the earmarked transfers and selected nation-wide priorities, provincial and lower levels of governments favor spending "close to home"; that is, mainly in the provincial capital city and at the prefecture and municipal level. Transfers – even if targeting specific counties – are transmitted through provincial governments/autonomous regions/municipalities and prefectures/districts (as illustrated in figure 1) and would be disproportionately spent on urban development (mainly urban infrastructure), leaving a shortage of resources at the county level and below to spend on essential social services. (39)

It is worth noting that weaknesses in sub-national public sector governance also complicate the enforcement of health-related laws, regulations and standards. For instance, although China passed a strict national food safety law and introduced a series of food safety standards in 2009, implementation of the law is poorly regulated, and food safety problems (such as the resurgence of melamine-contaminated dairy products in 2010) have persisted. Chinese media have also reported enforcement weaknesses in the areas of environmental, road, patient and drug and vaccine safety among others. Possible conflicts of interest at local level (such as local economic growth versus public health safety) are not systematically monitored and addressed.

Sub-national governments are yet to become truly accountable for local performance in the areas of regulatory and law enforcement, policy implementation and the financing and delivery of services, such as health care. Recently, the case of Shenmu County in Shaanxi province, where

local government has been strongly committed to a high-profile HSR pilot, has illustrated the difficulty of building an adequate surveillance and enforcement capacity at the local level. In spite of the effort so far, the National Audit Office reported misappropriation of health resources, including fake invoices. (40) Ensuring appropriate implementation of HSR may require improved monitoring and management of government performance across the different sub-national levels.

International experience has shown that factors outside the health system, namely the governance and macroeconomic and social policy environment, may act as constraints on health system strengthening. (41; 42) The health system strengthening agenda across countries has largely taken these constraints as given and exogenous. China, however, approached HSR with such a high level of government commitment that recognizing the broader institutional constraints of HSR might in fact help motivate improvements in public sector governance.

5. Public sector governance considerations

Our analysis indicates that public resource allocation and the underlying incentives at the sub-national levels may need to be better aligned with China's national priorities in order to facilitate HSR implementation. The public sector governance challenge for HSR may be *how* to ensure that sub-national governments have their responsibilities clearly defined in line with the national policies, standards, laws and regulations; how these responsibilities are implemented and how this is independently, reliably and regularly monitored, and that they have and allocate adequate resources so as to fulfill said responsibilities. International experience suggests that this may require strengthening accountability relationships across government levels and agencies, and between government agencies, providers of care and citizens. (43) Stronger accountability relationships would, in turn, allow for an increasing reliance on general-purpose equalization grants – in recognition that incentives of sub-national governments match national policy priorities – as opposed to earmarked transfers.

Given China's size and decentralization in financing and delivery of public services, it may be crucial to strengthen the role and accountability of provincial governments. Provincial governments may have to become explicitly responsible for equity and efficiency in public resource allocation, for national policy implementation, enforcement of laws, standards and regulations, and for adequate health system performance within the entire province.

The central government could specify viable fiscal targets for expenditure on primary health care across provinces and define the outputs and outcomes that each province should achieve in an equitable and cost-effective manner in the context of HSR. Making provincial governments explicitly responsible for results in HSR implementation at all levels may strengthen their commitment to improving public resource allocation, compliance and performance monitoring across levels in each province.

Furthermore, HSR implementation may be facilitated by centralizing key financing responsibilities and schemes at the provincial level. A single agency at the provincial level, for instance, could manage all social protection schemes in health (including the RCMS, Urban Employee BMI, URBMI and MFA schemes). Pooling resources for each of these schemes at the

provincial level would help address intra-provincial inequity. In addition, provincial-level agencies could develop capacity to establish a viable contracting and performance evaluation arrangement with the providers of care. Provinces could be incentivized to explore alternative service purchasing and payment mechanisms, based on schemes already piloted abroad, to improve efficiency of service provision. Moreover, provincial governments could boost their capacity to monitor the use of public resources by replacing the existing cascading system of transfers (which moves resources through several levels of government before they are actually spent) with direct payments from the provincial treasury system (via a treasury single account that is already operational in many provinces).

Importantly, the central government will have to effectively monitor and evaluate the use of public resources, policy implementation and overall service delivery performance across provinces, holding the provincial governments to account. As an innovative measure, citizen score card surveys could become a useful tool to gather citizens' feedback regarding their experience with public services (including their ability to utilize primary care and other services, the required fees and out-of-pocket payments, their ability to access relevant information and resolve complaints, and their satisfaction with services and with the performance of service providers, insurance schemes, local government agencies and others). Such a direct mechanism for obtaining citizens' feedback would allow the central government to better assess policy implementation performance at the local level, particularly with respect to equity and quality in service delivery. (20)

The independent assessment could effectively feed into a comprehensive performance management system and help strengthen accountability at the provincial and sub-provincial levels (across government agencies and providers) for the delivery of health care and other public services and their outcomes. The strong monitoring, evaluation and performance management system, internalizing and addressing citizens' feedback, with respect to service delivery (outputs) and its outcomes as well as public resource allocation at the local level, will boost incentives (and hence allow for a greater autonomy) at the provincial and sub-provincial levels.

In fact, overall improvements in public sector governance reforms are likely to generate equitable improvements in the health of Chinese citizens beyond HSR. This is because public governance reforms would enhance essential public service delivery in line with the national policies across sectors improving the social determinants of health, such as access to safe water, sanitation, basic health education, housing, rural access roads, social assistance, and others. (44)

Acknowledgements

We thank John Langenbrunner (World Bank) and Sarah Barber (WHO) for comments, and Jennifer Fong for assistance in data collection and analysis.

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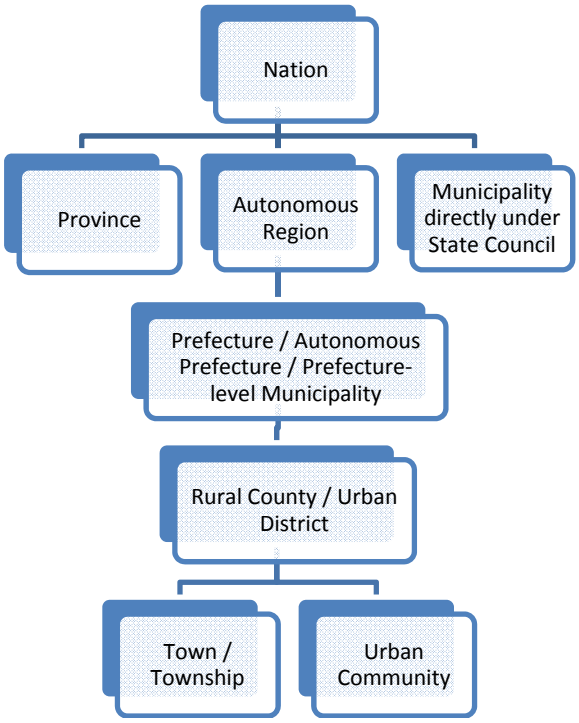
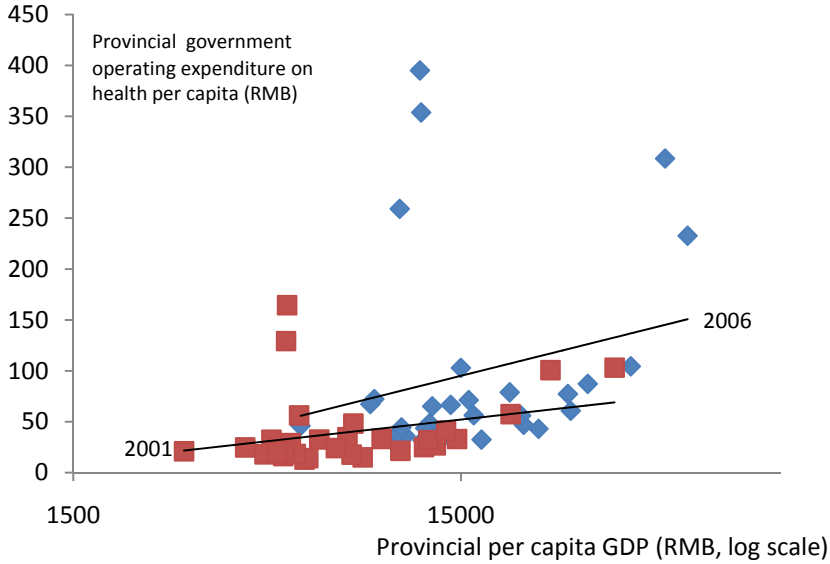
42. **Travis, P. et al.** Overcoming health-systems constraints to achieve the Millennium Development Goals. *Lancet.* 2004, Vol. 364, 9437.
43. **World Bank .** *Making Services Work for Poor People.* Washington DC : World Development Report, 2004.
44. **World Health Organization.** *Commission on Social Determinants of Health.* 2008. http://www.who.int/social_determinants/thecommission/finalreport/en/index.html.

Figure 1: China's five-tier government



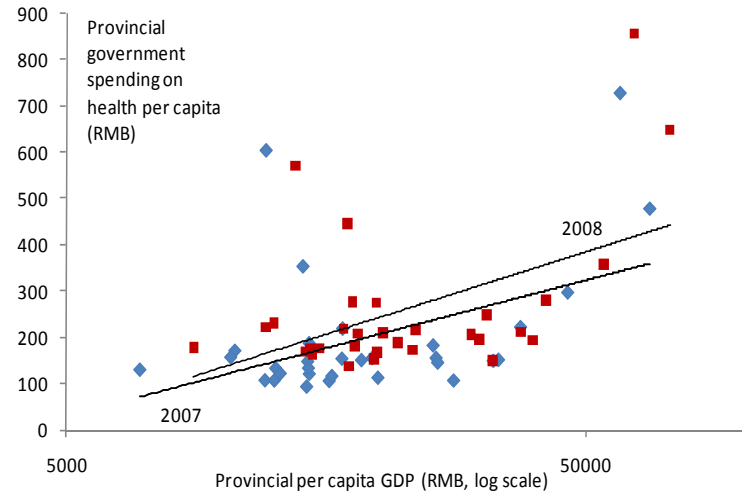
Source: Authors

Figure 2: Provincial government operating expenditure on health in relation to local GDP, 2001-2006



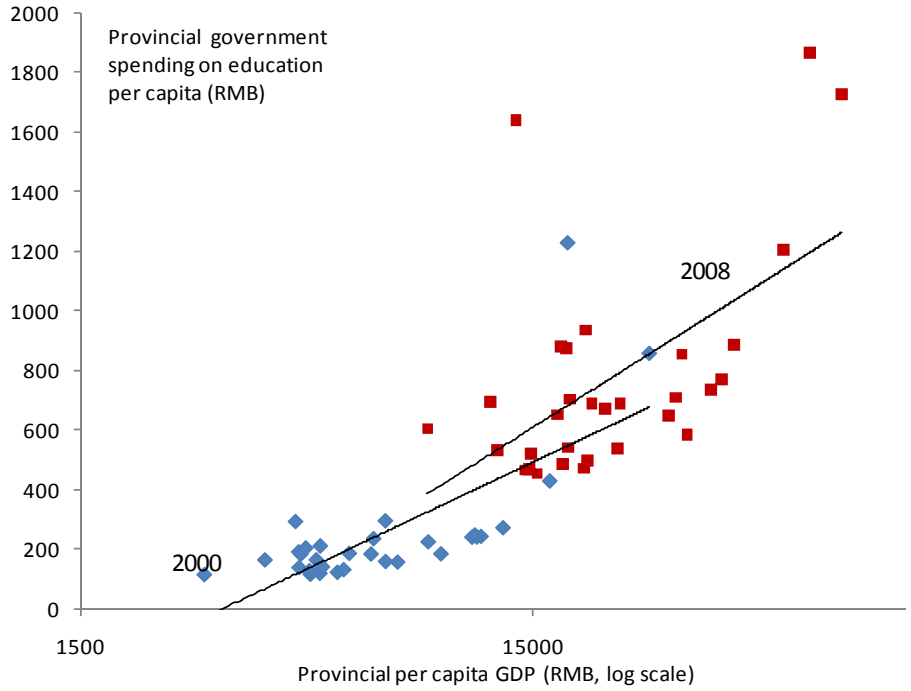
Note: A comparable figure for 2000 is not available. A new government budget classification methodology was introduced in 2007. Operating expenditure on health was a pre-2007 term, primarily including government subsidies to providers and excluding some health security programmes. From 2007, the definition of health spending was expanded.
Source: China Statistical Yearbooks

Figure 2A: Provincial government expenditure on health in relation to local GDP, 2007-2008



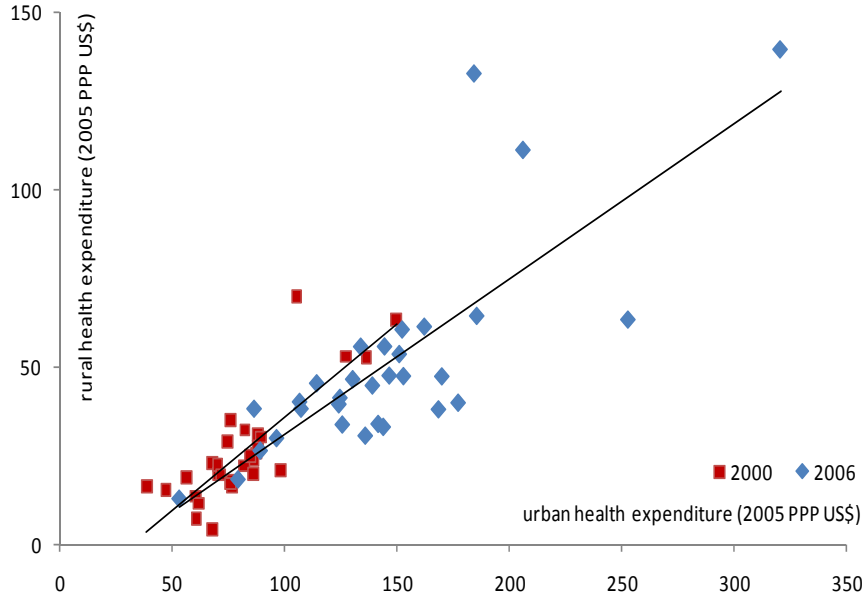
Source: China Statistical Yearbooks

Figure 3: Provincial government expenditure on education in relation to local GDP, 2000-2008



Source: China Statistical Yearbooks

Figure 4: Rural and urban total health expenditure per capita within provinces, 2000 and 2006



Source: Gapminder (www.gapminder.org).

Figures 5 and 5A: Prefecture-level government expenditure on health versus local GDP in Inner Mongolia and Shandong, 2000 and 2007

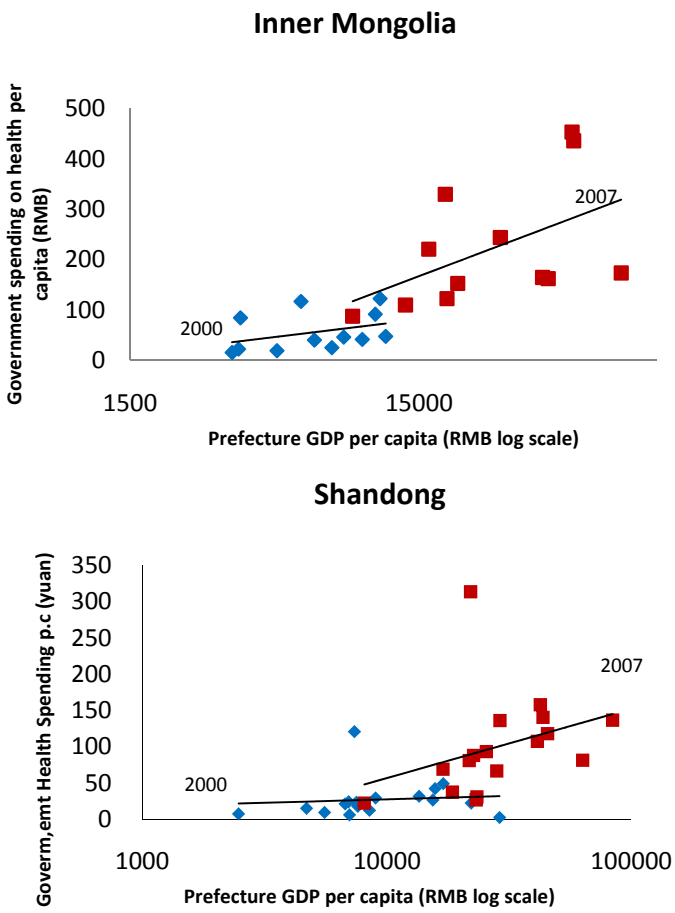
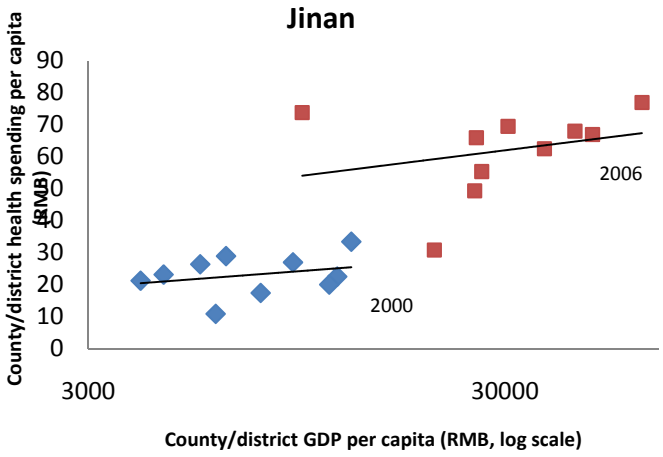


Figure 6 and 6A: County- and district-level government expenditure on health versus local GDP in Jinan and Zhengzhou Municipalities, 2000 and 2006



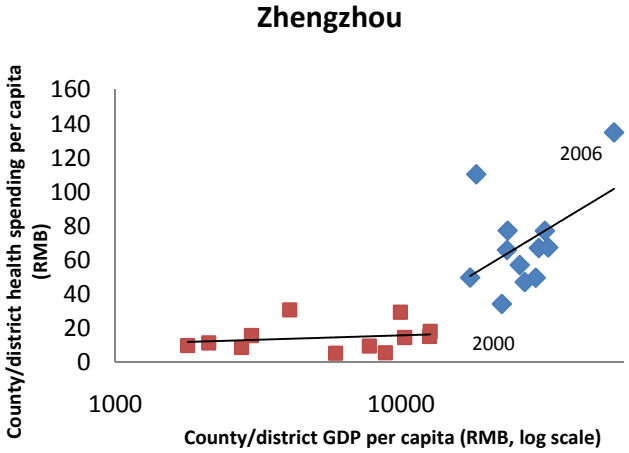
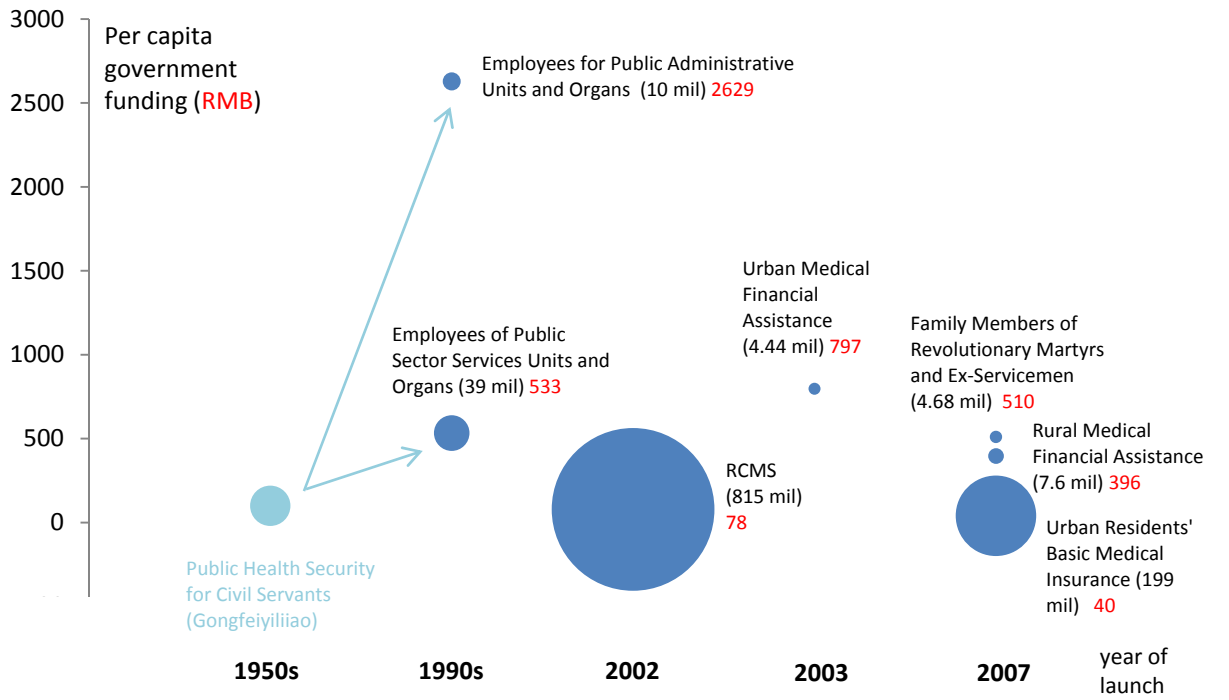


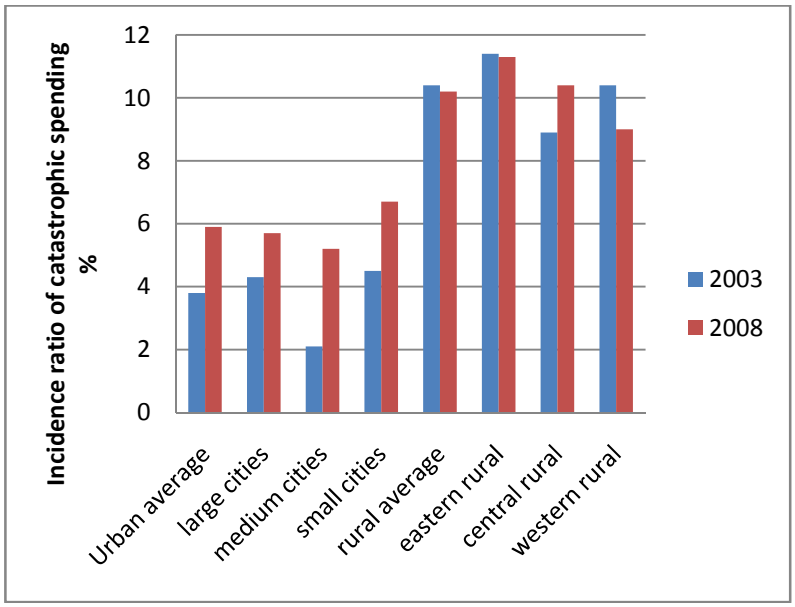
Figure 7: Government financing per participant across health security schemes introduced during 1950-2007



Note: Bubble size is equivalent to the number of participants. Number of participants is shown in parentheses. Government spending per participant is shown in red. Government funding figures are annual per person, except for the rural and urban medical financial assistance, reported per case.

Source: National Health Account Report 2009 and China Health Statistical Digest 2010

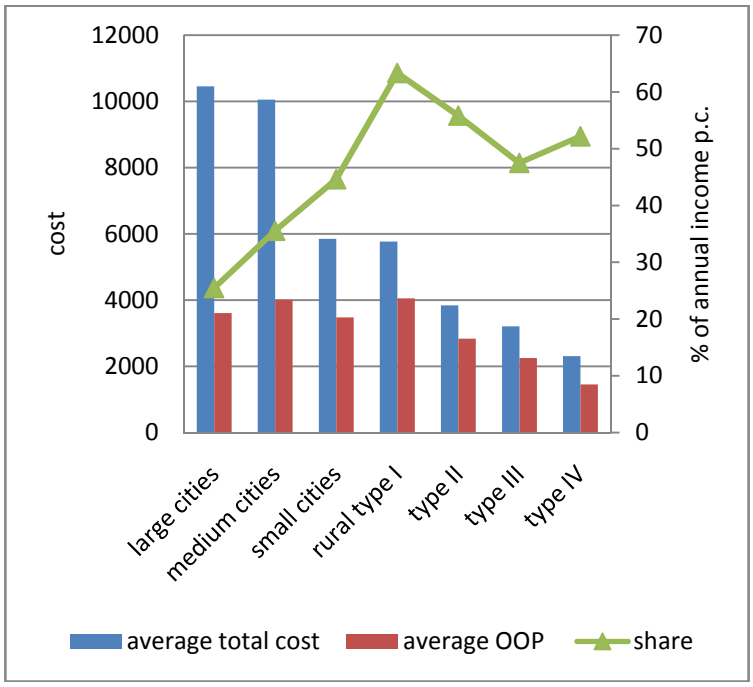
Figure 8: Catastrophic health expenditure among low-income households, 2003 and 2008



Source: China National Health Services Survey (NHSS) 2003 and 2008.

Note: According to China's NHSS, out-of-pocket health spending is catastrophic when exceeding 40% of annual household (HH) consumption. Low income HHs are those with per capita annual income below 50% of the mean annual HH income in the jurisdiction.

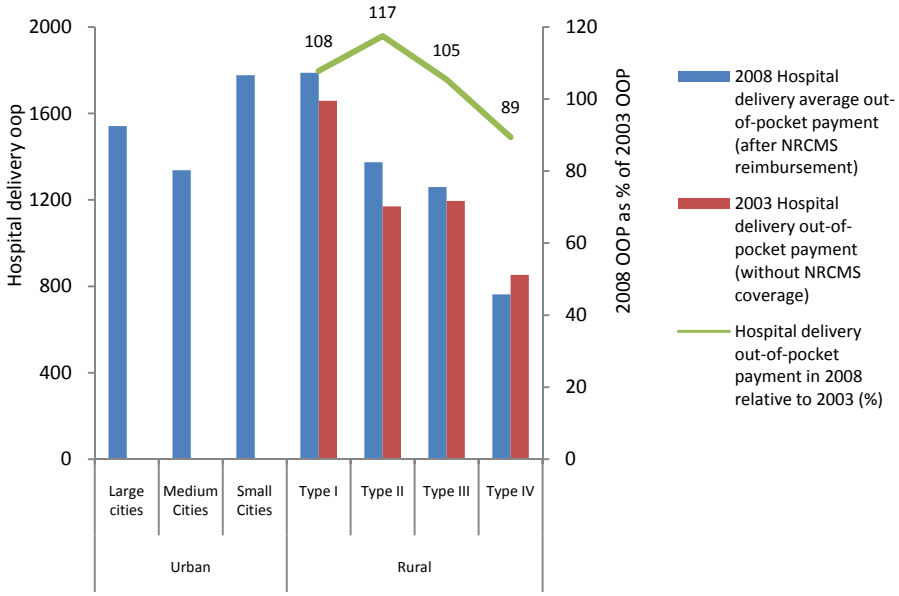
Figure 9: Average cost and out-of-pocket expenditure on in-patient care after insurance reimbursement, relative annual income per capita, by urban-rural typology, 2008



Source: NHSS 2008 and 2003.

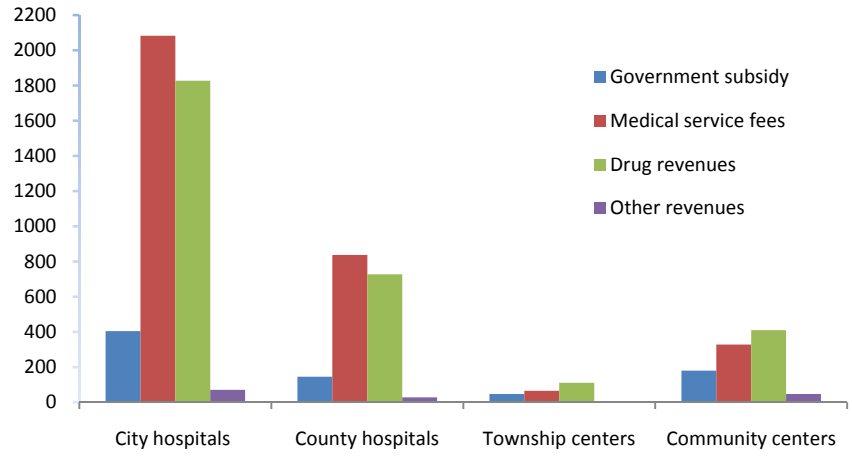
Note: The China MoH urban-rural socio-economic typology system is described in the 2006 joint government-UN review

Figure 10: Out-of-pocket expenditure for hospital delivery, 2003-2008



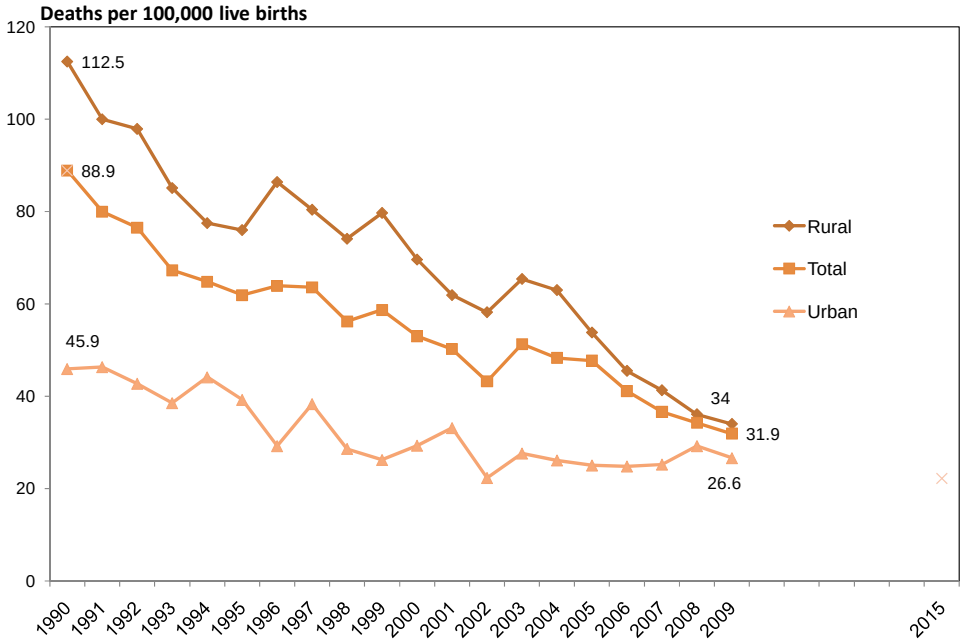
Source: NHSS 2008

Figure 11: The distribution of government subsidy across providers, 2008



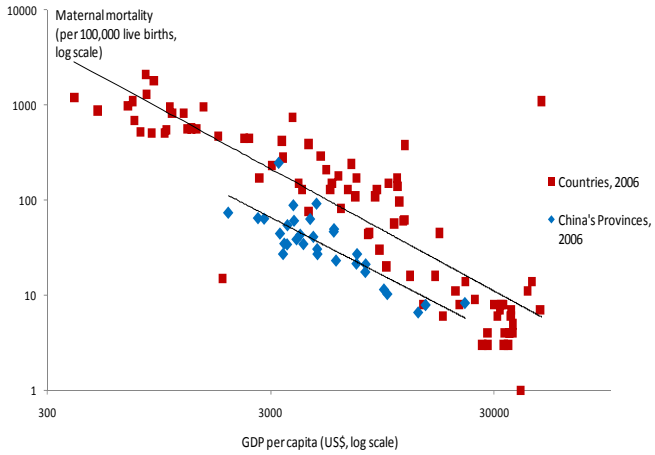
Source: 2008 National Health Financial Report, MoH

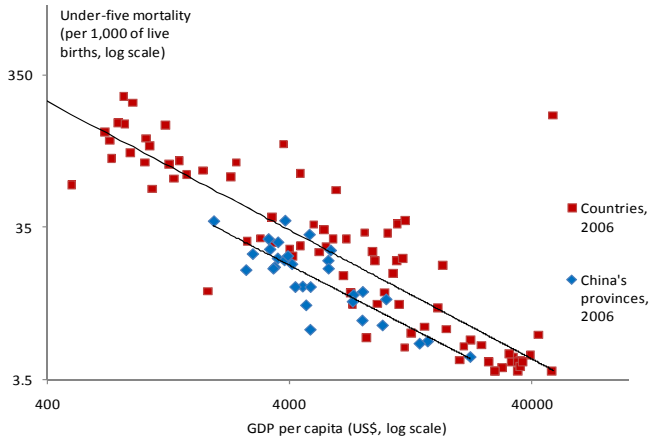
Figure 12: China's overall, rural and urban maternal mortality ratios, 1991 – 2009

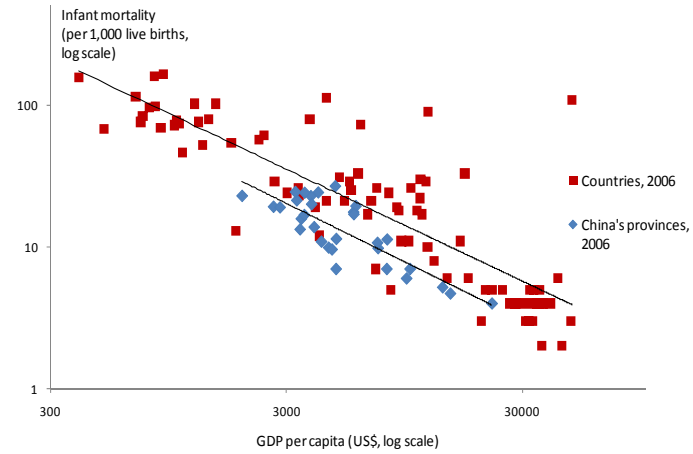


Source: Ministry of Health, *China Health Statistical Yearbook,* 2009 (1991 – 2008 data)
Ministry of Health, China Health Statistical Digest, 2010 (1990, 2009 data)

Figures 13, 13A and 13B: Maternal, child and infant mortality and GDP per capita: Relationship by province in China and by country internationally

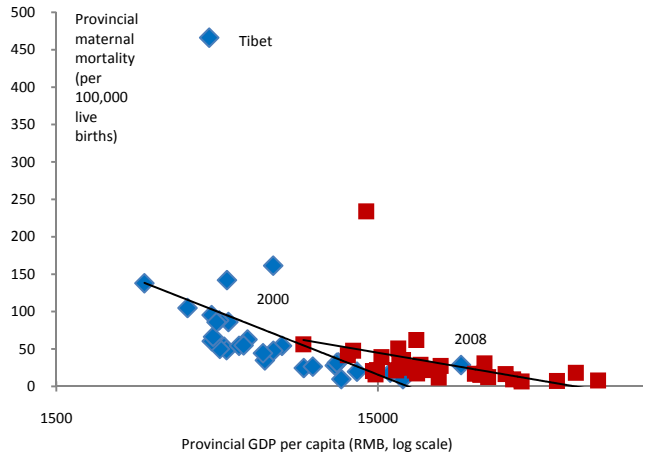


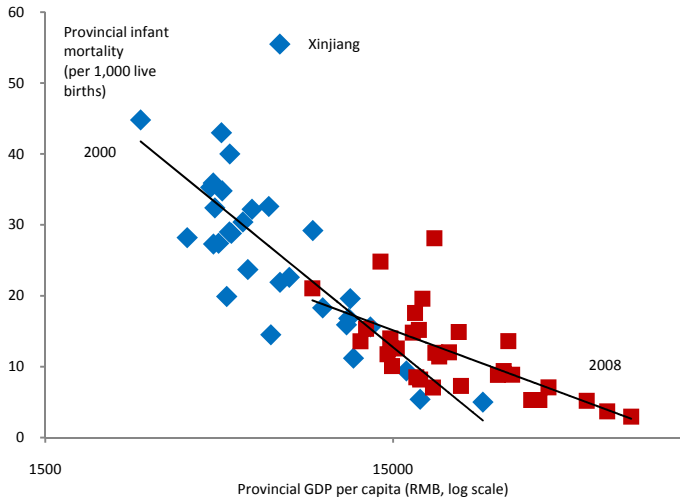


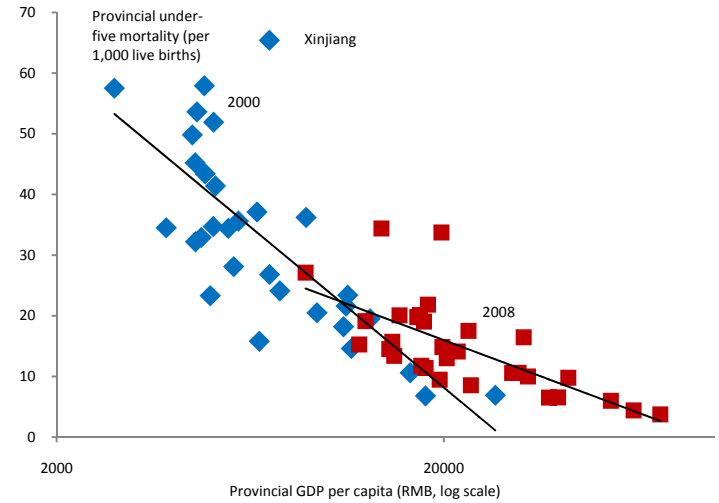


Source: Gapminder (www.gapminder.org)

Figures 14, 14A and 14B: Maternal, infant and child mortality and GDP per capita across provinces, 2000 and 2008

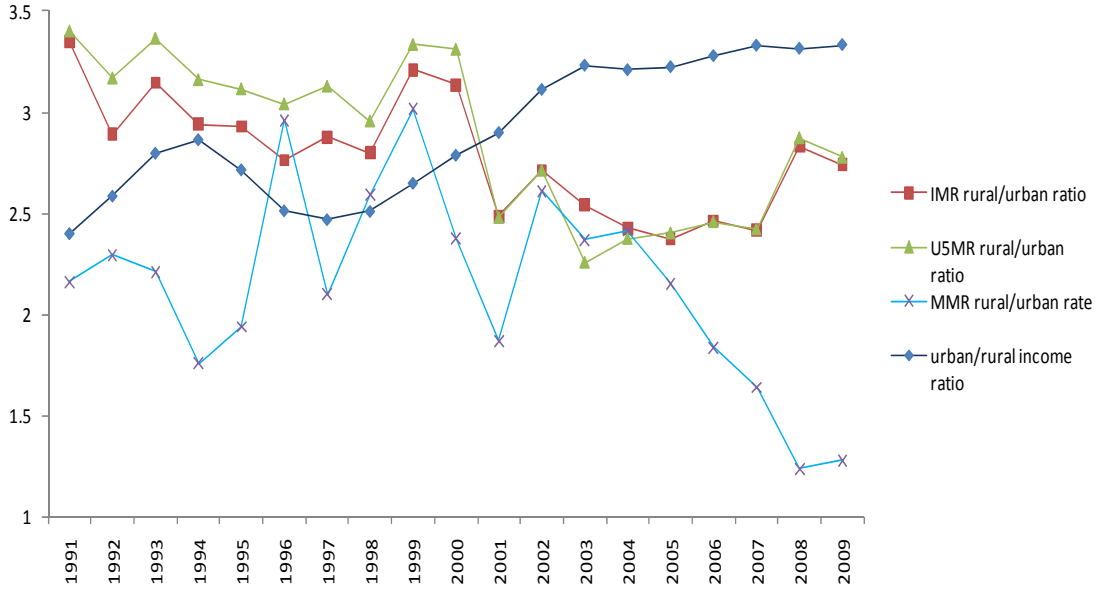






Source: DevInfo (UNICEF), a database system endorsed by the United Nations Development Group for monitoring human development. The mortality data in China used here is gathered through China's official maternal and child mortality surveillance system which until 2008 covered 116 surveillance sites covering 73million people in 31 provinces at the time of the last national census.

Figure 15: Falling rural – urban ratios in health outcomes and rising urban – rural ratio in income per capita, 1991-2009



Source: China Health Statistical Digest 2010

Figure 16: Inner Mongolia infant mortality rate (IMR) by prefecture versus GDP, 2000 and 2007

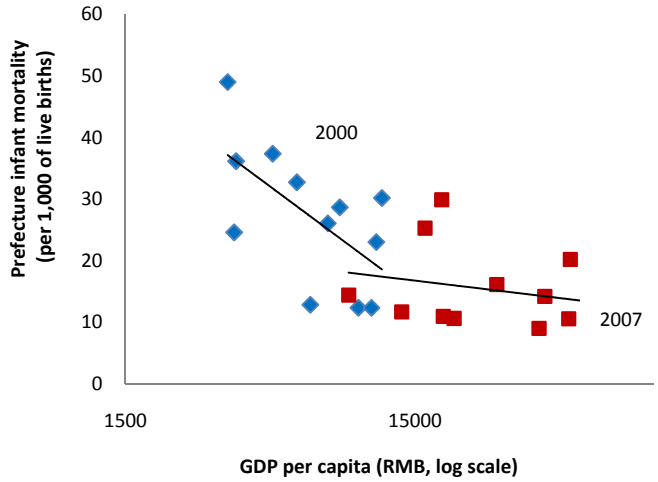
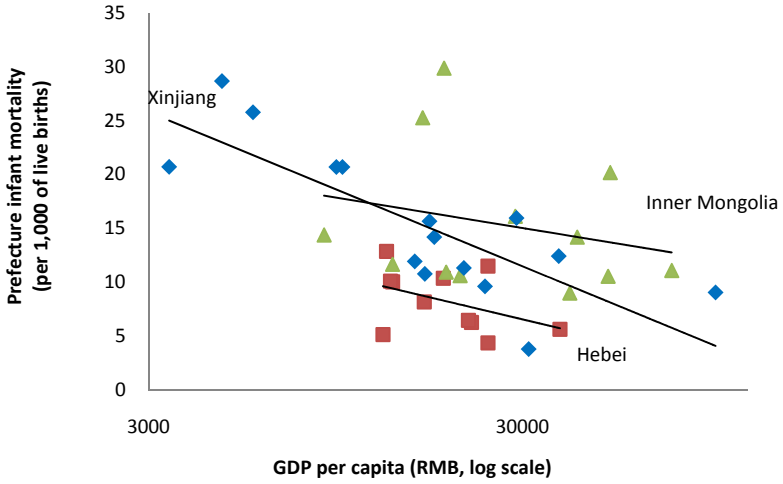


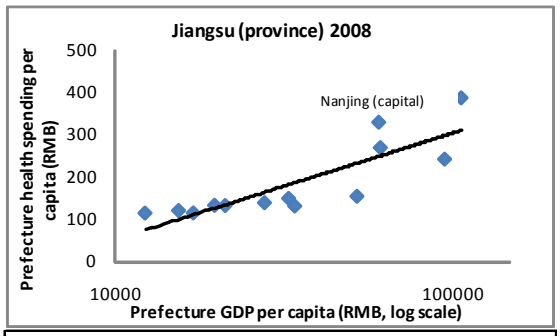
Figure 17: IMR by prefecture within three of China's provinces, 2007



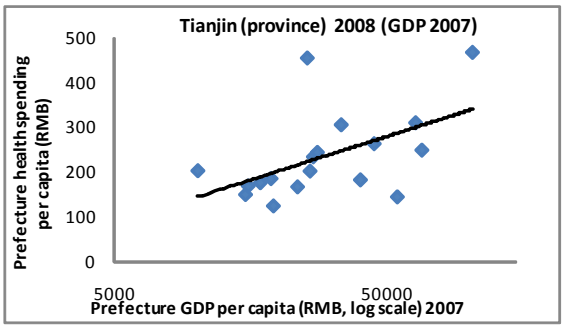
ANNEX A PUBLIC EXPENDITURE ON HEALTH

Figure A1: Public Expenditure on Health per Capita and GDP per Capita Across Prefectures Within Provinces

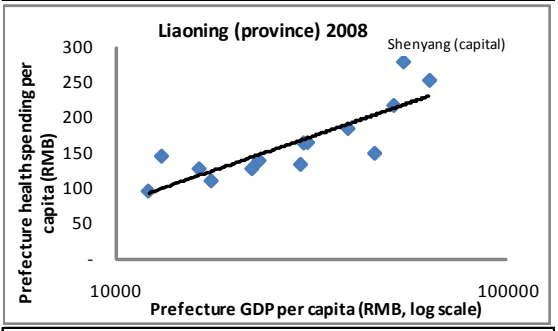
East



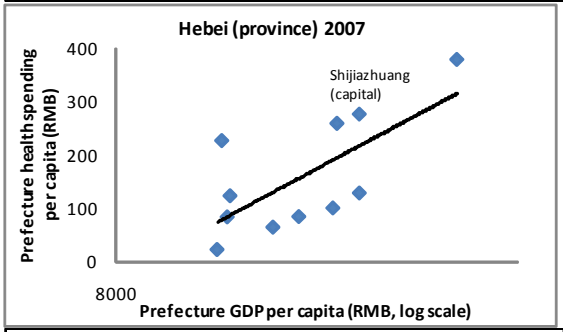
Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
185.88	386.76	114.47	3.38	90.61	0.49



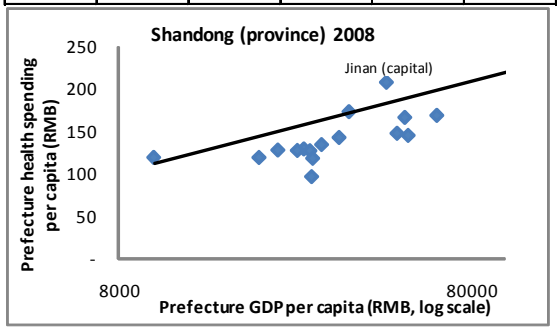
Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
234.98	466.45	124.63	3.74	97.16	0.41



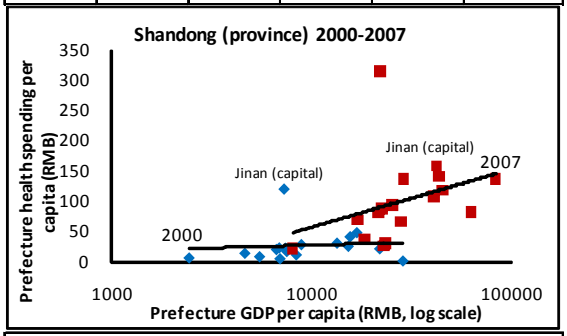
Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
163.14	278.57	95.21	2.93	53.15	0.33



Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
159.53	380.85	22.30	17.08	110.78	0.69

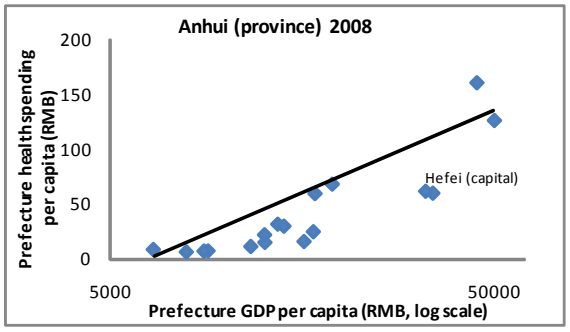


Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
145.84	208.09	97.78	2.13	31.58	0.22

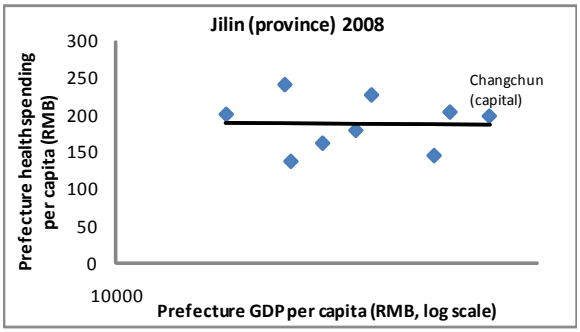


Public health spending per capita (2007)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
100.27	313.70	22.10	14.19	69.32	0.69
Public health spending per capita (2000)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
27.04	120.76	2.32	51.97	27.18	1.01

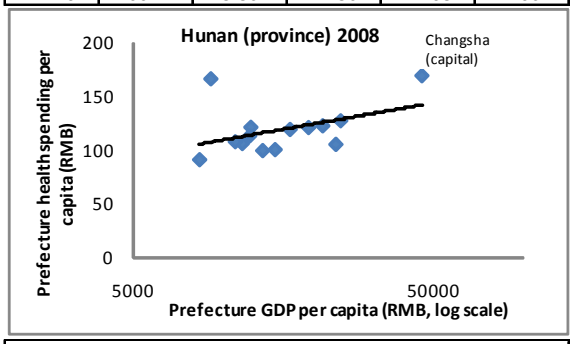
Centre



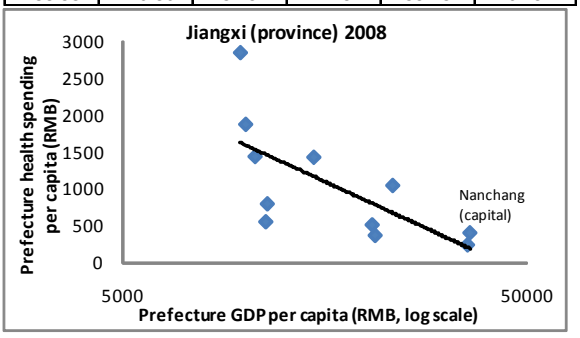
Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
41.70	160.42	5.86	27.36	44.08	1.06



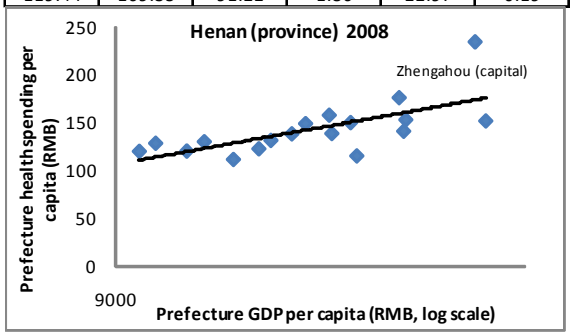
Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
188.53	240.86	137.94	1.75	35.13	0.19



Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
119.44	169.35	91.22	1.86	22.97	0.19

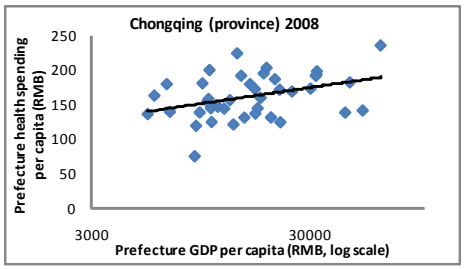


Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
1053.88	2854.04	247.98	11.51	795.96	0.76

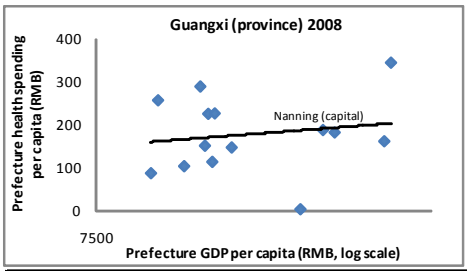


Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
143.39	234.19	112.44	2.08	28.13	0.20

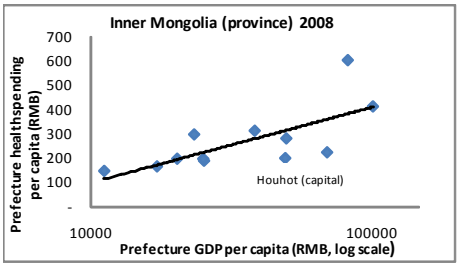
West



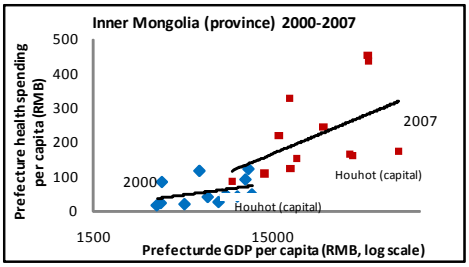
Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
162.40	236.65	75.95	3.12	32.17	0.20



Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
179.24	347.26	4.80	72.34	88.62	0.49

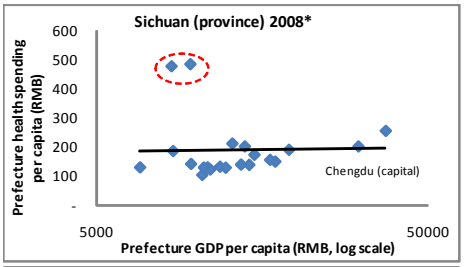


Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
266.90	601.37	145.14	4.14	129.45	0.49



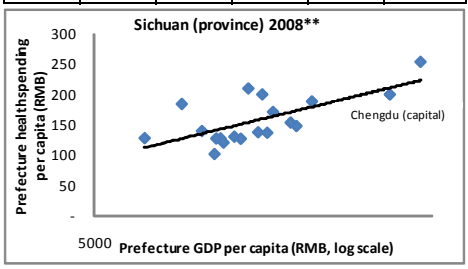
Public health spending per capita (2007)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
221.43	453.20	87.69	5.17	122.77	0.55

Public health spending per capita (2000)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
56.26	122.63	15.73	7.79	38.00	0.68



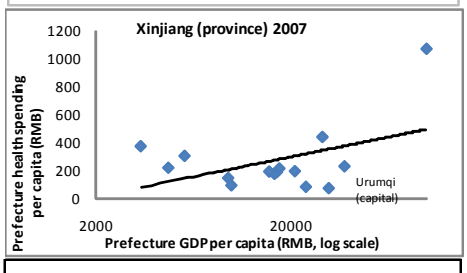
Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
189.07	189.07	189.07	1.00	103.64	0.55

* The two points within the circled area contain prefectures, Aba 阿坝藏族羌族自治州 (population 894,077)and Ganzi 甘孜藏族自治州 (population 975,207). Each prefecture attributes to 1% of the total population of 81,331,778. c



Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
158.42	254.72	103.21	2.47	39.01	0.25

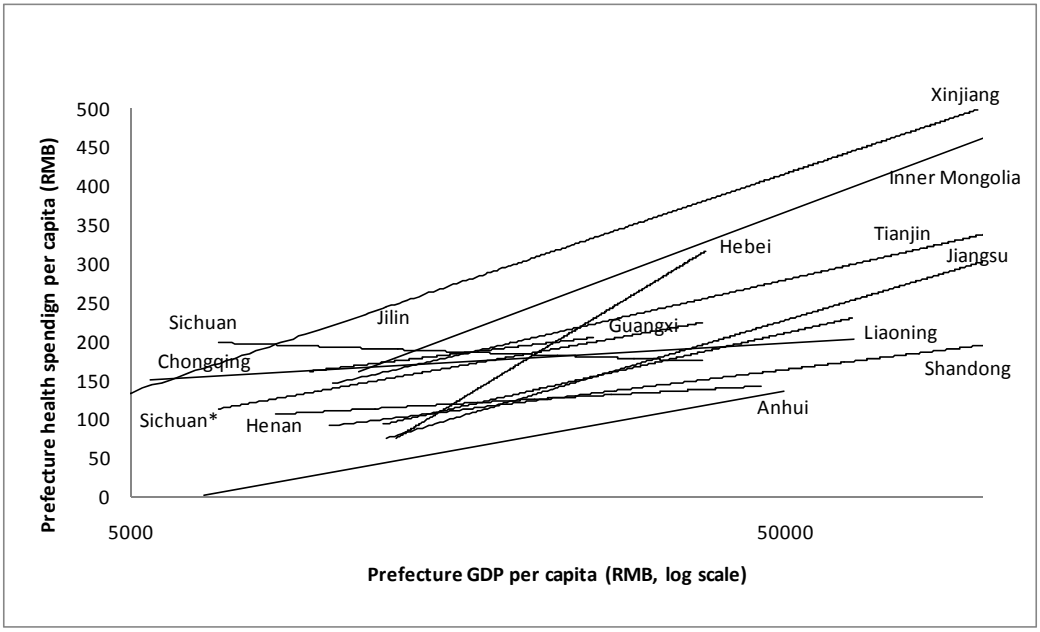
** This graph excludes the two prefectures, Aba 阿坝藏族羌族自治州and Ganzi 甘孜藏族自治州.



Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
234.98	466.45	124.63	3.74	97.16	0.41

Source: China Statistical Yearbooks and Provincial Statistical Yearbooks

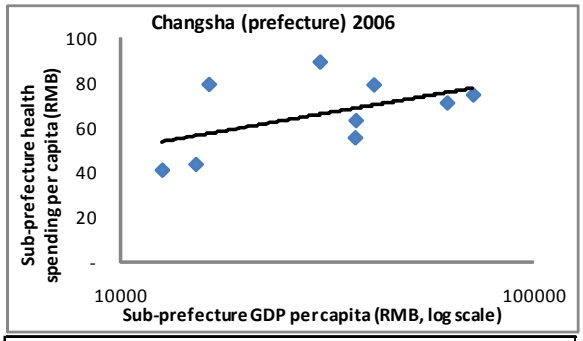
Figure A2: The Relationship Between Public Expenditure on Health per Capita and GDP per Capita Across Prefectures Within Provinces (Trend lines for each selected province across prefectures), for the most recent available year (2007 or 2008)

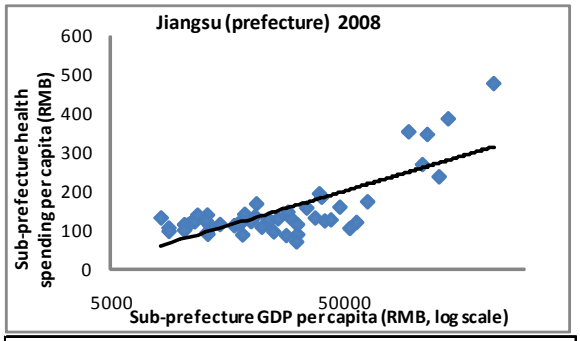


* This trend line excludes the two prefectures, Aba 阿坝藏族羌族自治州 (population 894,077) and Ganzi 甘孜藏族自治州 (population 975,207). Each prefecture attributes to 1% of the total population of 81,331,778.

Source: China Statistical Yearbooks and Provincial Statistical Yearbooks

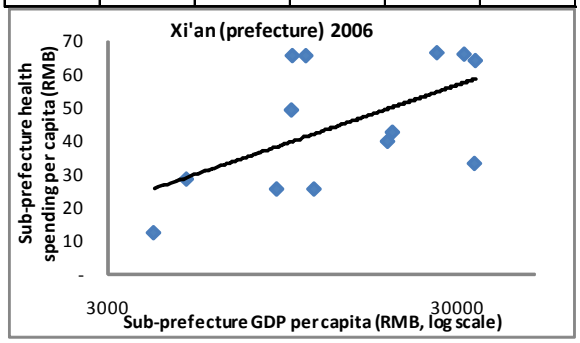
Figure A3: Public Expenditure on Health per Capita and GDP per Capita Across Sub-prefectures in Selected Provinces

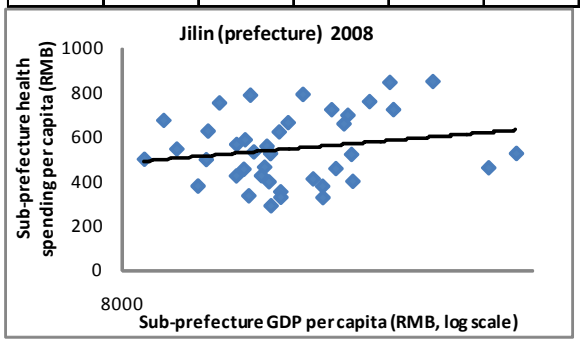




Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
66.40	89.55	40.99	2.18	16.80	0.25

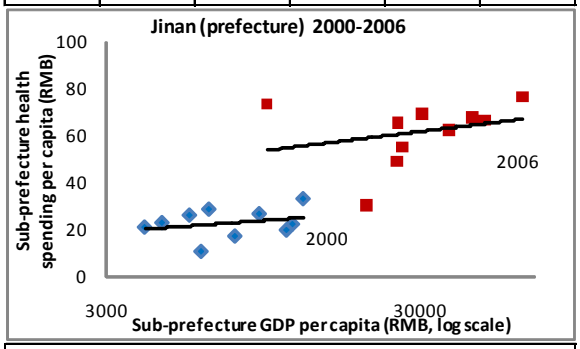
Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
149.34	478.95	70.48	6.80	80.44	0.54

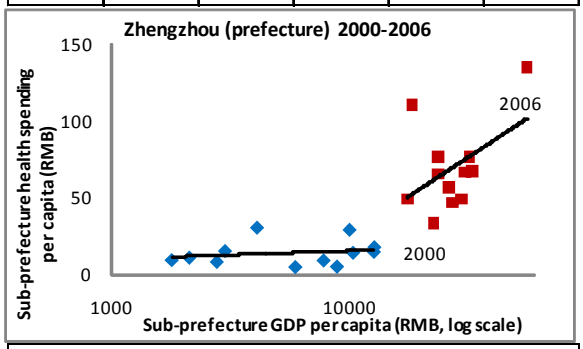




Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
45.08	66.67	12.36	5.40	19.24	0.43

Public health spending per capita					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
547.53	852.74	291.16	2.93	157.27	0.29



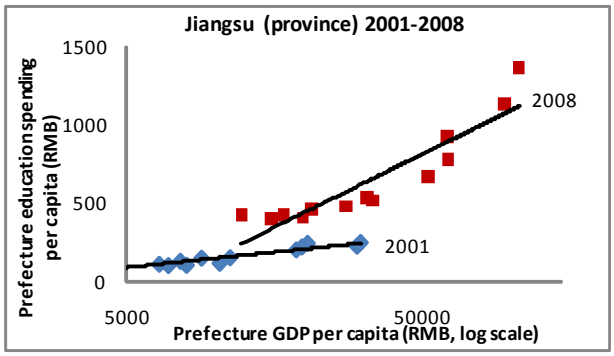


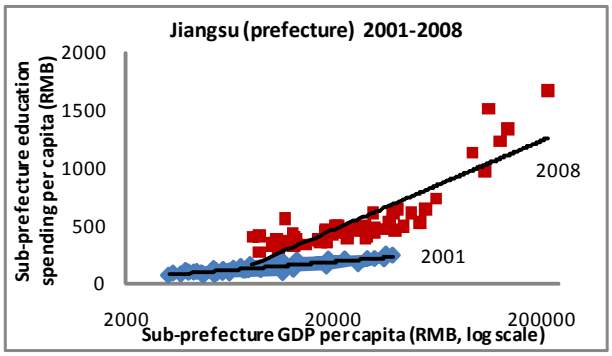
Public health spending per capita (2006)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
61.84	76.87	30.78	2.50	13.62	0.22
Public health spending per capita (2000)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
23.05	33.39	10.82	3.09	6.34	0.28

Public health spending per capita (2006)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
45.08	66.67	12.36	5.40	19.24	0.43
Public health spending per capita (2000)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
14.46	30.70	5.29	5.80	8.28	0.57

Source: China Statistical Yearbooks and Provincial Statistical Yearbooks

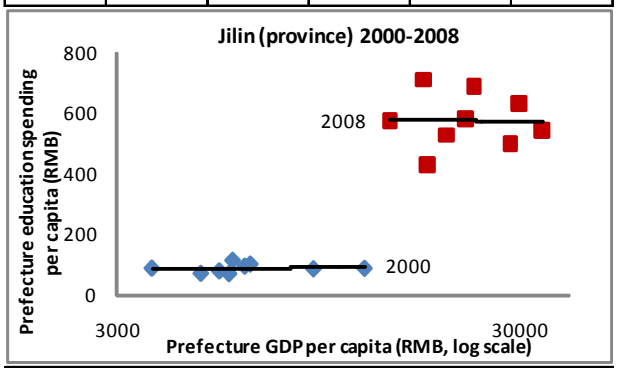
Figure A 4: Public Expenditure on Education per Capita and GDP per Capita Across Prefectures and Sub-prefectures in Selected Provinces

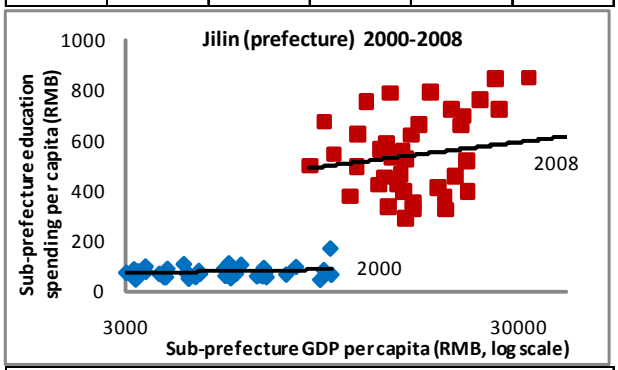




Education spending per capita (2008)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
661.53	1375.04	407.92	3.37	311.09	0.47
Education spending per capita (2001)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
166.63	250.88	100.81	2.49	56.42	0.34

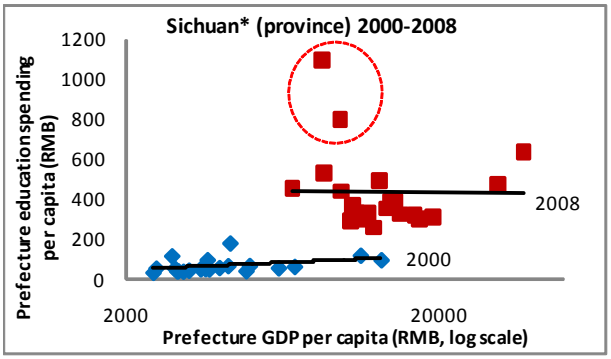
Education spending per capita (2008)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
548.26	1674.40	272.78	6.14	304.07	0.55
Education spending per capita (2001)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
137.69	252.84	73.66	3.43	45.72	0.33





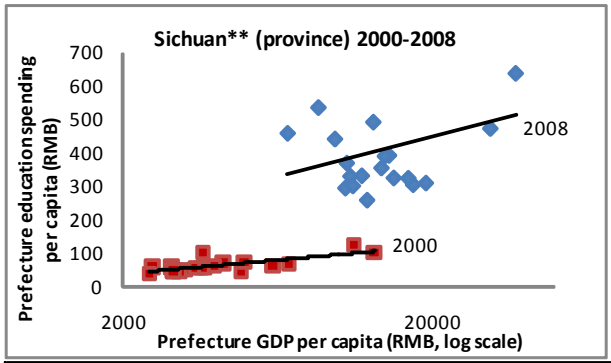
Education spending per capita (2008)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
577.03	712.60	430.16	1.66	90.21	0.16
Education spending per capita (2000)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
88.88	113.56	71.68	1.58	13.45	0.15

Education spending per capita (2008)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
547.53	852.74	291.16	2.93	157.27	0.29
Education spending per capita (2000)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
81.85	176.23	51.79	3.40	22.77	0.28



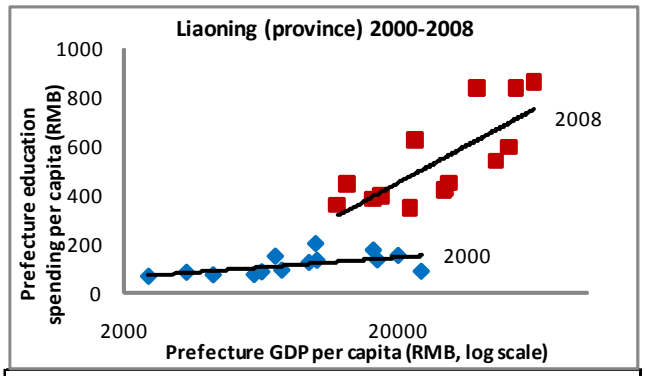
Education spending per capita (2008)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
441.18	441.18	261.91	1.68	197.68	0.45
Education spending per capita (2000)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
74.43	186.79	40.06	4.66	35.59	0.48

* The two points within the circled area contain prefectures, Aba 阿坝藏族羌族自治州 (population 894,077)and Ganzi 甘孜藏族自治州 (population 975,207). Each prefecture attributes to 1% of the total population of 81,331,778. c



Education spending per capita (2008)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
387.74	387.74	261.91	1.48	96.91	0.25
Education spending per capita (2000)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
65.97	125.74	40.06	3.14	22.37	0.34

** This graph excludes the two prefectures, Aba 阿坝藏族羌族自治州and Ganzi 甘孜藏族自治州.

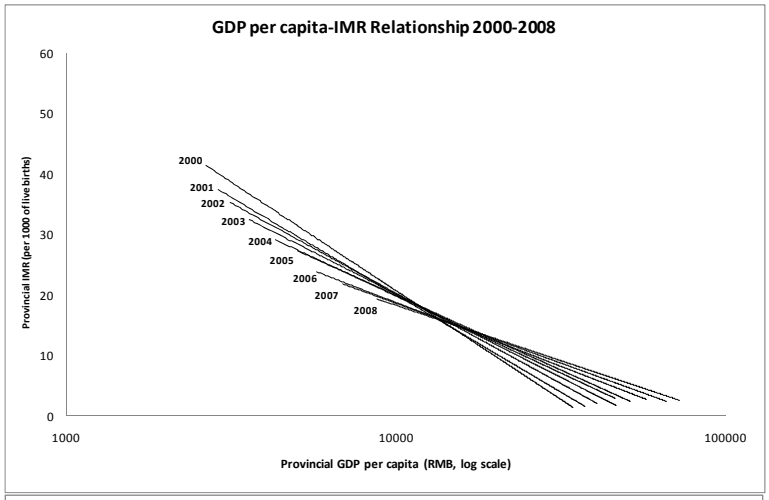


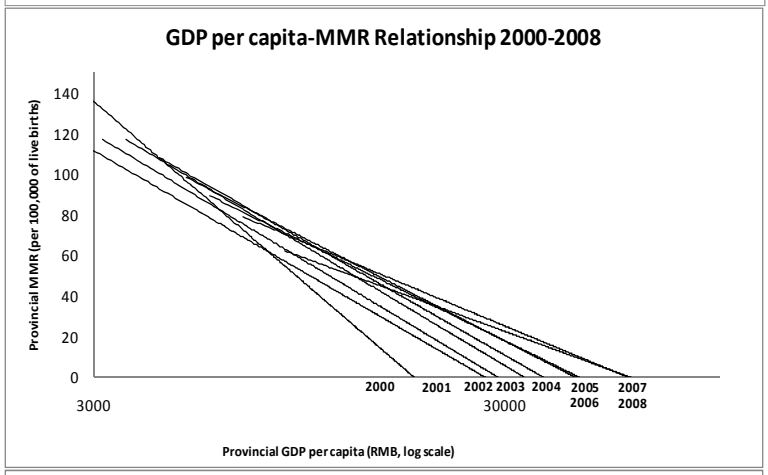
Education spending per capita (2008)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
541.27	867.12	352.55	2.46	186.83	0.35
Education spending per capita (2000)					
Mean	Highest	Lowest	Highest/ lowest	Standard deviation	Coefficient of variance
117.39	202.75	67.49	3.00	42.48	0.36

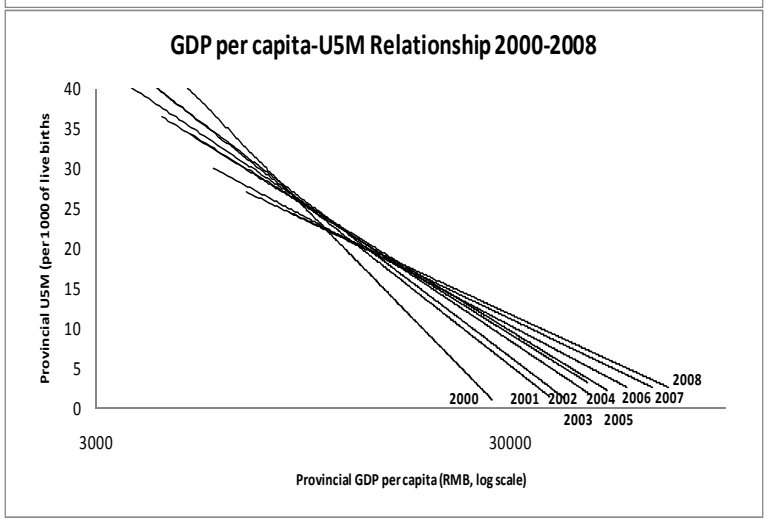
Source: Provincial Statistical Yearbooks

ANNEX B: DISPARITIES IN INCOME LEVELS AND HEALTH OUTCOMES

Figure B1: The Relationship Between Infant Mortality Rate, Under-five Mortality Rate and Maternal Mortality Rate, and GDP per Capita, 2000-2008 (Trendlines for each given year across provinces)







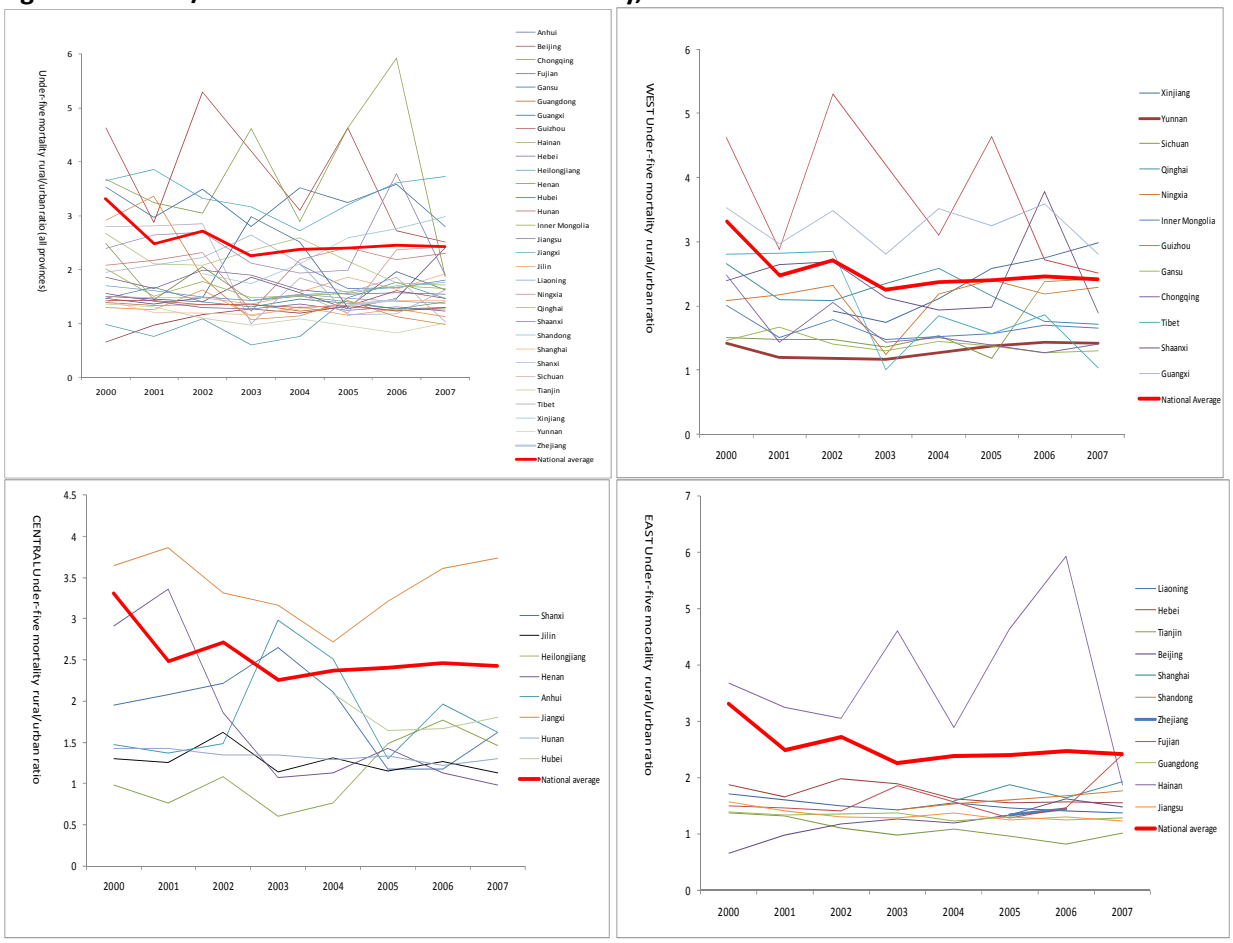
Source: DevInfo

Table B1: Urban/Rural Ratio in Annual Disposable Income Per Capita, 2000 and 2008

Province	2000	2008	Direction of variation
Anhui	2.74	3.09	↑
Beijing	2.25	2.32	↑
Chongqing	3.32	3.48	↑
Fujian	2.30	2.90	↑
Gansu	3.44	4.03	↑
Guangdong	2.67	3.08	↑
Guangxi	3.13	3.83	↑
Guizhou	3.73	4.20	↑
Hainan	2.46	2.87	↑
Hebei	2.28	2.80	↑
Heilongjiang	2.29	2.39	↑
Henan	2.40	2.97	↑
Hubei	2.44	2.82	↑
Hunan	2.83	3.06	↑
Inner Mongolia	2.52	3.10	↑
Jiangsu	1.89	2.54	↑
Jiangxi	2.39	2.74	↑
Jilin	2.38	2.60	↑
Liaoning	2.27	2.58	↑
Ningxia	2.85	3.51	↑
Qinghai	3.47	3.80	↑
Shaanxi	3.55	4.10	↑
Shandong	2.44	2.89	↑
Shanghai	2.09	2.33	↑
Shanxi	2.48	2.89	↑
Sichuan	3.10	3.07	↓
Tianjin	2.25	2.46	↑
Tibet	5.58	3.93	↓
Xinjiang	3.49	3.26	↓
Yunnan	4.28	4.27	↓
Zhejiang	2.18	2.45	↑

Source: DevInfo

Figure B2: Rural/Urban Ratio in Under-five Mortality, 2000-2007



Source: DevInfo

Table B2: **Rural/Urban Ratio in Under-five Mortality Rate, 2000-2007 (Descriptive statistics)**

Under-five mortality (rural/urban ratio)	Mean	Standard deviation	Coefficient of variation	Highest	Lowest
2000	2.06	0.93	0.45	4.63	0.66
2001	1.92	0.82	0.43	3.86	0.76
2002	2.01	0.95	0.47	5.30	1.08
2003	1.83	0.97	0.53	4.61	0.60
2004	1.80	0.66	0.37	3.52	0.76
2005	1.85	0.94	0.51	4.63	0.96
2006	1.95	1.05	0.54	5.93	0.82
2007	1.75	0.63	0.36	3.73	0.98

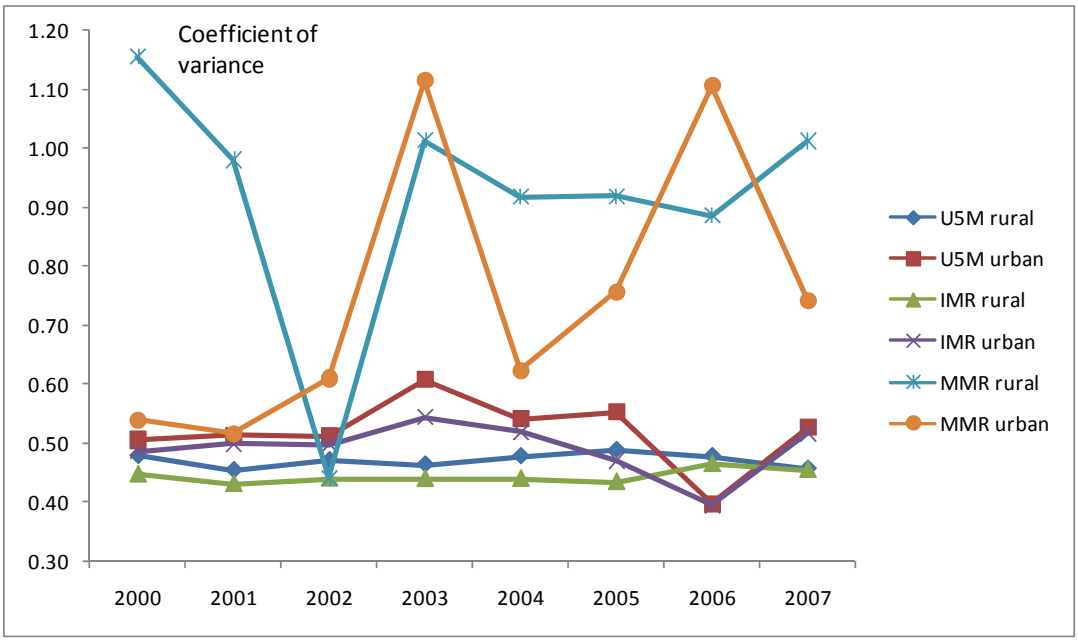
Source: DevInfo

Table B3: Under-five and Infant Mortality Rates, and Maternal Mortality Ratio, Rural&Urban Areas, 2000-2007

	Mean	Standard deviation	Coefficient of variation	Highest	Lowest	Highest/ Lowest
U5M rural						
2000	36.97	17.71	0.48	74.30 (Xinjiang)	5.20 (Beijing)	14.29
2001	32.19	14.62	0.45	63.10 (Sichuan)	7.60 (Beijing)	8.30
2002	32.89	15.50	0.47	62.10 (Xinjiang)	7.70 (Beijing)	8.06
2003	28.71	13.32	0.46	60.00 (Sichuan)	7.20 (Beijing)	8.33
2004	24.82	11.87	0.48	52.90 (Sichuan)	5.80 (Beijing)	9.12
2005	23.04	11.27	0.49	46.60 (Sichuan)	6.10 (Beijing)	7.64
2006	20.06	9.60	0.48	40.10 (Tibet)	5.40 (Tianjin)	7.43
2007	17.96	8.20	0.46	35.45 (Tibet)	5.89 (Beijing)	6.02
U5M urban						
2000	18.98	9.60	0.51	42.60 (Sichuan)	6.50 (Shanghai)	6.55
2001	18.08	9.29	0.51	42.60 (Sichuan)	7.80 (Beijing)	5.46
2002	17.53	8.97	0.51	41.70 (Sichuan)	6.60 (Beijing)	6.32
2003	18.06	10.97	0.61	45.10 (Heilongjiang)	5.70 (Beijing)	7.91
2004	14.47	7.82	0.54	39.00 (Heilongjiang)	4.60 (Shanghai)	8.48
2005	13.59	7.51	0.55	39.20 (Sichuan)	4.40 (Shanghai)	8.91
2006	10.87	4.32	0.40	21.59 (Tibet)	4.77 (Shanghai)	4.53
2007	10.73	5.65	0.53	34.36 (Tibet)	3.88 (Shanghai)	8.86
IMR rural						
2000	30.32	13.56	0.45	62.40 (Xinjiang)	4.00 (Beijing)	15.60
2001	25.22	10.88	0.43	46.60 (Sichuan)	5.60 (Beijing)	8.32
2002	26.35	11.60	0.44	52.40 (Xinjiang)	5.50 (Beijing)	9.53
2003	23.65	10.40	0.44	43.70 (Sichuan)	5.80 (Beijing)	7.53
2004	20.15	8.87	0.44	35.90 (Guizhou)	4.80 (Beijing)	7.48
2005	18.60	8.09	0.43	31.00 (Guizhou)	4.80 (Beijing)	6.46
2006	16.47	7.66	0.47	30.90 (Shaanxi)	4.50 (Tianjin)	6.87
2007	14.78	6.73	0.46	27.86 (Xinjiang)	4.72 (Beijing)	5.90
IMR urban						
2000	15.63	7.59	0.49	34.90 (Xinjiang)	4.80 (Shanghai)	7.27
2001	14.59	7.27	0.50	32.00 (Sichuan)	5.60 (Shanghai)	5.71
2002	14.39	7.16	0.50	31.20 (Sichuan)	5.60 (Beijing)	5.57
2003	14.64	7.96	0.54	34.00 (Sichuan)	5.90 (Beijing)	5.76
2004	11.80	6.13	0.52	30.80 (Heilongjiang)	3.70 (Shanghai)	8.32
2005	10.86	5.11	0.47	24.40 (Sichuan)	3.70 (Shanghai)	6.59
2006	8.71	3.44	0.39	16.30 (Gansu)	2.20 (Hainan)	7.41
2007	8.79	4.54	0.52	26.65 (Tibet)	2.89 (Shanghai)	9.22
MMR rural						
2000	86.31	99.65	1.15	531.80 (Tibet)	13.40 (Beijing)	39.69
2001	72.88	71.42	0.98	349.40 (Tibet)	8.40 (Beijing)	41.60
2002	26.35	11.60	0.44	433.7 (Xinjiang)	12.90 (Tianjin)	4.06
2003	74.32	75.33	1.01	404.60 (Tibet)	12.60 (Tianjin)	32.11
2004	64.04	58.72	0.92	321.60 (Tibet)	8.90 (Tianjin)	36.13
2005	60.52	55.58	0.92	307.50 (Tibet)	15.20 (Zhejiang)	20.23
2006	51.87	45.91	0.89	249.50 (Tibet)	5.40 (Tianjin)	46.20
2007	45.43	45.95	1.01	260.03 (Tibet)	2.60 (Tianjin)	100.01
MMR urban						
2000	38.86	20.98	0.54	82.90 (Xinjiang)	7.10 (Beijing)	11.68
2001	37.70	19.47	0.52	89.10 (Xinjiang)	13.80 (Beijing)	6.46
2002	33.12	20.21	0.61	84.00 (Xinjiang)	7.30 (Tianjin)	11.51
2003	43.20	48.14	1.11	259.70 (Tibet)	6.90 (Beijing)	37.64
2004	34.33	21.41	0.62	120.30 (Tibet)	5.80 (Shanxi)	20.74
2005	32.77	24.77	0.76	120.10 (Tibet)	1.50 (Shanghai)	80.07
2006	32.66	36.11	1.11	208.90 (Tibet)	7.10 (Beijing)	29.42
2007	32.82	24.34	0.74	140.20 (Tibet)	6.93 (Shanghai)	20.23

Source: DevInfo

Figure B3: Coefficient of Variance for Under-five Mortality, Infant Mortality and Maternal Mortality, Rural and Urban, 2000-2007



Source: DevInfo