From **Division of International Health (IHCAR)**
DEPARTMENT OF PUBLIC HEALTH SCIENCES
Karolinska Institutet, Stockholm, Sweden

HEALTH CARE FINANCING IN CHINA: EQUITY IN TRANSITION

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Stockholm 2002

Published and printed by Karolinska University Press
Box 200, SE-171 77 Stockholm, Sweden

ISBN 91-7349-270-1

ABSTRACT

The aim of the thesis is

- to assess equity in the provision, financing and utilization of health services in the study counties, after the launching of the Chinese health reform, in relation to income and health status,
- to assess equity in utilization, financial barriers to care and poverty impact and the association of financial variables; alternative health insurance systems and out-of-pocket financing and the association of non-financial variables; gender, age, education, occupation and geographical distance to health facilities.

The data collection was carried out from 1993 to 1996. Retrospective, cross-sectional and panel data were collected in an expenditure review, a household survey (n=5756) and a provider survey (n=1064). The health expenditure review was designed as a natural experiment with 'twin' counties, one insurance-based and one out-of-pocket funded. The data sources were health accounts and interviews with officials in two of the counties. The household and provider surveys were based on multi-stage sampling. The provider survey involved health staff at county hospitals, township hospitals and village health stations and included curative, preventative and traditional medicine. Triangulation of methods and perspectives improved validity. The analysis was based on quantitative methods, including multivariate analysis.

The study has shown that after the launching of the Chinese health reform (around 1985), the mix of health services shifted to less preventative and more curative services and a higher proportion of tertiary curative services. This was more pronounced in the insurance-based county. The majority of clinical doctors confirmed moral hazard by admitting that they alter prescriptions with consideration to the patients' financial status. A high level of inequity in illness, health care utilization, financing and financial difficulties was observed. Inequity in utilization was related to income, health insurance coverage and age. Registration at birth is a precondition for equal access. A gender bias was found in the high number of unregistered girls in five of the six counties, actual number of girls under 18 years at home exceeded the number reported in pregnancy histories by 22%. The elderly (8.1% of the population) utilized a disproportionally small share (4%) of inpatient services.

The ratio of negative pregnancy outcomes (miscarriage or still birth) increased by 170% from 1985-89 to 1990-95, while utilization of hospital delivery and qualified delivery supervision decreased. More than 90% of CMS (Cooperative Medical System) participants had qualified delivery supervision. The risk of adverse outcomes was 4.5 times higher for out-of-pocket paying mothers than for mothers with health insurance. CMS was associated with better health, three times less risk of illness with a duration of at least one month, five times less risk of financial difficulties and half the risk of care-induced debt. Other health insurance systems were associated with higher costs, without reducing barriers to care or improving health.

It is suggested that equity has ethical, political and fiscal aspects. The decreasing share of public financing of health services signals a need to involve the Ministry of Finance in discussions how to ensure adequate levels of public funding for rural health care. Professional norms and ethics need to be revived with the objective of creating a health system with quality-oriented incentives and improved equity.

Key words: equity, gender, health expenditure, health financing, health insurance, health reform, health services, family planning, maternal health, tuberculosis, China

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VI. Bogg L, Health Care in Six Chinese Counties: Equity in Crisis?, Submitted manuscript

VII. Bogg L, Wang KL and Diwan V, Chinese Maternal Health in Adjustment: Claim for Life, Submitted manuscript

CONTENTS

LIST OF ABBREVIATIONS

CMS	Co-operative Medical System (Rural Health Insurance)
COMAC/HSR	Commission of the European Communities, Health Services Research
DALY	Disability Adjusted Life Year
Gongfei	(China) Health Insurance for State Employees
HFA	Health For All by the Year 2000
HMO	Health Maintenance Organization
IBRD	International Bank for Reconstruction and Development (World Bank)
IHCAR	Division of International Health, Department of Public Health Sciences, Karolinska Institutet
IMF	International Monetary Fund
IMR	Infant Mortality Rate (deaths before one year per 1000 live births)
Laobao	(China) Health Insurance for Enterprise Employees
MCH	Maternal and Child Health
MMR	Maternal Mortality Rate (deaths per 100,000 live births)
NHS	(U.K.) National Health System
OECD	Organization for Economic Cooperation and Development
PHC	Primary Health Care
RMB	Renminbi Yuan (Approx. USD 1 = RMB 8)
SAP	Structural Adjustment Policies
SES	Socio-Economic Status
SAREC	Department for Research Co-operation with Developing Countries
Sida	Swedish International Development Co-operation Agency
SMU	Shanghai Medical University (Fudan University)
Unicef	United Nations Children's Fund
U.K.	United Kingdom
U.S.	United States of America
WDR	World Development Report (World Bank)
WB	World Bank
WHO	The World Health Organization
WHO/EURO	The WHO Regional Office for Europe

1 THESIS SUMMERY – MAIN SECTION

The aim of the thesis is

- to assess equity in the provision, financing and utilization of health services in the study counties, after the launching of the Chinese health reform, in relation to income and health status,
- to assess equity in utilization, financial barriers to care and poverty impact and the association of financial variables; alternative health insurance systems and out-of-pocket financing and the association of non-financial variables; gender, age, education, occupation and geographical distance to health facilities.

Equity is defined as 'fairness', 'right judgement', 'principles of justice outside the common law or Statute law, used to correct laws when these would apply unfairly'. Equity thus has an ethical and moral aspect, which equality lacks. Clearly, this moral and judgmental aspect of equity, can create problems in operationalizing the concept. The study was based on a conceptual framework, modified from M. Whitehead, reflecting the circular relationship between health status, health care utilization and socio-economic status (poverty).

The study involved both qualitative and quantitative methods, although the qualitative analyses have not been reported in papers so far. The first phase of the study was a retrospective *health expenditure review* in two counties in Jiangsu province yielding panel data. The sources of the data were interviews with responsible health officials, reviews of available reports, documents and health sector accounts. The amount of funds allocated from provincial, prefectural or county governments was assessed. The fee-for-service systems were examined and the amount of funds raised by user fees was assessed. The purpose was to obtain aggregate revenue and expenditure data for the two counties in a *natural experimental* design with one 'insurance' county and one twin 'out-of-pocket' county. Rothman describes; …'the "natural experiment". When experimentation is not possible, the ideal circumstances for the epidemiologist are those in which nature contrives to produce the conditions that would have been achievable if an experiment had been conducted. By far the most renowned example, the prototype of all natural experiments, is the elegant study of cholera in London conducted by John Snow."

In our case we had a natural experimental situation where the 'natural intervention' was the health reform, which implicated decentralization of management, charging of fees and reduced public financing of rural health care. The effects could be studied in two different settings, one with health insurance coverage for the majority of the population and one without health insurance.

The results from the expenditure review influenced the design of the household and the provider surveys.

The household survey (n=5756) was conducted in six counties with a total population of 3,360,000 in central China. The survey took place in August and September 1995. The households were selected by four-stage sampling. The original plan was to select three provinces having rural health insurance systems, representing different levels of

GNP/capita (high, medium, low) and different infant mortality rates (low, medium, high). Within each of the three provinces (Jiangsu, Anhui and Jiangxi), two counties were purposely selected. The original aim was that they should represent different health financing systems (insurance/out-of-pocket), but similar socio-economic characteristics. In practice, the counties were selected on the basis of being within reasonable travel distance from Shanghai and agreeing to allocate staff time for the research co-operation. The selection of the provinces and counties was contingent on the willingness of provincial and local health authorities to cooperate. As it turned out, all the authorities that were approached agreed to participate in the study. All the townships were listed and divided into two groups according to income levels. In case there were insurance systems in the county, townships were divided into four groups. From the two or four groups of townships, four were selected randomly. One town in the county was selected randomly. All the villages in the selected townships were listed and five from each township were selected randomly. Finally, all the households in the selected towns and villages were listed on the basis of the police registry and enumerated. Fifty households in the towns and ten in each village were selected randomly.

The questionnaire was developed through a consultative process involving Karolinska Institutet and Shanghai Medical University. It was field tested in different counties in China. Information on education, occupation, family income, health insurance, distance to health facilities, health status, disease history, outpatient health care expenditure at last visit in last two weeks and inpatient in last twelve months, was collected for all household members. Women aged 15 to 49 years were asked about their pregnancy and delivery histories, antenatal, delivery and postnatal service utilization.
Five percent of the sample was re-interviewed, comparing item by item the response and checking each questionnaire for logic mistakes, confusing responses or incompleteness. In March 1996 a Chinese-speaking Swedish research assistant re-interviewed 25 households (10%) in one county for quality control.

A similar multi-stage sampling procedure was used for *the provider survey*. Systematic sampling was used to select 1064 providers at health facilities at county (tertiary hospital), township (secondary hospital) and village health station levels. Providers from both the curative and the preventative networks, as well as traditional medicine, were included.

The expenditure review found that fee-for-service charges provided 90.3% and 85.5% respectively of the health system revenue in the two counties in 1992.
A higher growth rate for health care expenditure and tertiary curative expenditure was identified for the combination of fee-for-service and health insurance than for the combination of fee-for-service and out-of-pocket financing

The household survey demonstrated that subsequent to the health reforms in the 1980s, utilization of essential preventative services dropped. Hospital deliveries decreased by 12% and qualified delivery supervision decreased by 17% from 1985-89 to 1990-95. Logistic regression analysis showed that the likelihood of safe delivery increases with income, money in the bank and coverage by health insurance or prepayment system and decreases with higher parity births and greater distance to secondary care. The first

half of the 1990s resulted in decreasing utilization of essential delivery services and an increase in negative delivery outcomes (miscarriage and stillbirth).

To be registered at birth is a fundamental human right and normally a precondition for access to health and educational services. Significant differences were found between number of girls in the official registries and the actual number of girls in the households, in five of the six counties. The findings indicate systematic under-registration of girl births, with potentially grave consequences for their access to health and education services.

The provider interviews confirmed moral hazard in provider behavior. The findings provide evidence of the etiology of the observed inequities and support the assumptions of causal direction in the associations found in the analysis of the household survey data. The majority of clinical doctors confirmed that they alter prescriptions with consideration to the patients' financial status and the demand from the patients. It was found that tertiary level providers were more inclined to change their prescriptions than providers at lower levels. Eighty percent of the doctors treating tuberculosis patients replied that tuberculosis patients never or only sometimes complete the full treatment course.

The degree of inequity in health status, the financing and utilization of health care was measured and financial difficulties, barriers to care and care-induced debt was assessed. The association of key financial and non-financial attributes at household and individual levels, especially alternative health financing systems, was assessed by multivariate analysis. Important results came out of the analysis. First, a differential impact of alternative health insurance systems was identified. The co-operative health insurance (CMS) was associated with a more than three times less risk of severe illness, a five times lower risk of facing financial difficulties, a statistically non-significant risk reduction by half of ending up in debt due to medical costs and importantly not one CMS participant in the survey having to refrain from seeking care due to costs. Other health insurance systems were associated with higher costs, without evidence of improving health or reducing barriers. Second, high age was correlated with both higher needs and much lower utilization. Multiple regression analysis showed that the low utilization by the elderly could not be explained by confounding from income or health insurance coverage. A higher educational level was associated with better health, better access and less risk of financial difficulties.

On 13 March 1997, the Ministry of Health, the State Planning Commission, the Ministry of Finance, the Ministry of Agriculture and the Ministry of Civil Affairs issued a joint statement recommending that 'all levels throughout the country must give high priority to developing and improving rural cooperative health care and work hard to put into effect various forms of cooperative health care in most rural areas by the year 2000.'
Unfortunately, the recommendations from the central levels have neither been accompanied by action nor public funding. The impact of the recommendations has accordingly been negligible. Regressive financial incentives and profit interests have developed in the vacuum of public financing in the last two decades. Efforts to influence professional norms and ethics are needed. It will be necessary to convince the

Ministry of Finance and political leaders at central, regional and local levels of the importance of public funding as an instrument for quality and equity assurance, both from human welfare point of view and from economic aspects. Investments in economic development will be wasted if basic education and health needs are neglected. It is hoped that this study, together with other studies, will provide arguments for the policy dialogue.

2 INTRODUCTION

2.1 PREVENTION AND CURE

A man visited his friend's house and saw that his kitchen range had a very straight chimney by the side of which a lot of firewood was stacked.
The visitor said to his host, 'You ought to make the chimney crooked and remove the firewood from it, or else you may have a fire on your hands.'

His host did not reply. Not long afterwards a fire broke out. Luckily, the man was helped by his neighbors and was able to put out the fire.

To thank his neighbors for the assistance, he killed his calf and invited them for a feast. Those who had been scorched by the fire were given the place of honor and the rest were seated according to the service that they had rendered.
But the man who had suggested that he change the chimney and remove the firewood was not invited.
One of the guests remarked to the host, 'If you had listened to your friend in the first place, you would not have had a fire and you would have had no need to slaughter the calf and prepare this feast. Now, when you invite the guests because of what they did to help you, are you going to pass over the one who advised you to take precautions and merely honor those who were hurt by the flames?'
The host realized his oversight and invited his friend.

This short story was written down two thousand years ago by the historian Ban Gu. (History of the Han Dynasty; Hanshu, AD 1rst century)

Clearly, avoiding unwanted fires is the best option, but when the fire has broken out, help is needed to put it out. The value of such assistance is easily understood, while the value of advice on how it could have been avoided is not so obvious. The cost of the fires that never broke out can only be guessed.

The story illustrates what health economics should be, preventative-oriented analysis of the consequences of alternative paths of action, aiming to avoid unwanted fires. The challenge of rational priority-setting is not new to mankind.

3 BACKGROUND

This chapter of the thesis presents the political background to health reforms in a global perspective and in a Chinese perspective. Health reforms are historically and politically closely linked to the global shift in politics and the promotion of structural adjustment policies in the 1980s.

3.1 ADJUSTMENT AND HEALTH REFORMS IN A GLOBAL PERSPECTIVE

3.1.1 The Global Health Reform Epidemic

Where there is life there is change. All living beings go through processes of development, maturation and degeneration. So do organizations and systems, although quite understandably they strive to avoid or at least defer degeneration. Health systems always have been and will be affected by political decisions and reacting to social and economic changes.

Since the 1980s issues related to health sector reforms have been more intensively debated than ever. Many countries launched or intensified health sector reforms in the recent two decades. Klein described it as a 'global epidemic' of health care reforms.[1] Often the official motive for health reform has been to raise the *efficiency* of the sector. Not infrequently, the explicit or implicit aim has been to subject the health sector to market-orientation, which is seen as a strategy for improving efficiency. Some of the key efficiency-related reform agendas have been; privatization, decentralization, management autonomy and professionalization, separation of purchaser-provider roles, contracting of services, evidence-based care, quality assurance, strengthened patient roles, rational priority setting and reforms of financial flows.

Health reforms also aim to *improve resource flows*, either by cost containment or by identifying new financial sources and to improve *equity* in access to and utilization of health services and ultimately to achieve improved equity in health.

Health reforms may, however, also be seen in the perspective of shifts in economic ideologies.[2] In a study of the experiences of health reforms in the European Region, commissioned by the World Health Organization Regional Office for Europe (WHO/EURO), it was noted that macroeconomic pressures in the latter part of the 1990s suggested that publicly financed and/or operated systems risked facing retrenchment, regardless of how efficiently and effectively they were operating. The background was the severe financial pressures on governments.[3]

3.1.2 Keynes, the Welfare State and the Bretton Woods Institutions

The international economic thinking in the period from the Second World War up to the 1980s was dominated by the ideas of the British economist John Maynard Keynes. Keynes noted that the 'outstanding faults of the economic society in which we live are its failures to provide full employment and its arbitrary and inequitable distribution of wealth'.[4] This observation led him to develop strategies and tools to reduce the effects of the inherent imbalances in the market system. Keynes was the mastermind behind

the establishment of the Bretton Woods institutions; the International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (IBRD), commonly known as the World Bank.
Keynes motives for proposing the establishment of IMF and IBRD were to create institutions and instruments to stabilize exchange rates and to counterbalance the cyclical nature of the global economy and by that expanding international trade, preventing economic depression and poverty.

The establishment of the Bretton Woods institutions of course also had political implications. Keynes wanted to create an international fund of almost unlimited size, which could assure liquidity for states in need, without any interference in domestic macroeconomic or social welfare policies. This was, however, not accepted by the U.S. administration. The U.S. delegation was headed by Harry Dexter White, who saw the Bretton Woods institutions as an adjunct to American economic power. White wanted to promote international trade and, at the same time, to preserve the central role of the U.S. dollar in international trade. Ironically, four years later White was to die from a heart attack three days after a hearing before the Committee on Un-American Activities of the U.S. House of Representatives.[5]

Wolfe notes 'Rather than protecting vulnerable economies from a depression, which had been the original idea, the fund was becoming a device to ensure the dependence of poor countries on the market. The IMF that came out of Bretton Woods, like domestic macroeconomic planning in the United States, was counter-Keynesian, designed to do the opposite of its original intention. Keynes himself agreed to these changes only with the greatest reluctance, knowing that America had the power in these matters and that the choice was between a fund on American terms or no fund at all.'[6]

Keynes is seen as the proponent of an active welfare state, where the state intervenes by adjusting tax levels and public spending with the objective of keeping unemployment levels low.

3.1.3 The policies of Reagan and Thatcher and Health Reform

Reagan and Thatcher represented a shift from traditional Keynesian economics and welfare state policies.[7] They argued for a clear break with the historic tendency that had been prevailing thus far in the 20th century to continue the expansion of *civil rights* (individual freedom) to *political rights* (participation in governance) and further to *social rights* (reducing social inequities).
Reagan and Thatcher were preceded by a global economic recession which started with the sharp rise in oil prices following the 1973-1974 oil crises. As a result world trade receded and the rich countries' share of world trade also shrank, contributing to a weakened global economic and political influence of the West in general and the U.S. in particular.
When the recession hit the industrialized countries in the late 1970s the issues of economic redistribution became more sensitive and difficult than they had been previously in an economy of growth.

Both Thatcher and Reagan had promised their voters tax cuts and they also delivered cuts in taxes and in public services. Their policies inspired many countries in the 1980s to place budget adjustment high on the political agenda.
The Thatcher government made statements that indicated a political wish to see market forces introduced in the health sector in the U.K. and making the patients pay more of the costs. Enthoven in 1985, in an analysis of the NHS, proposed the creation of an internal market giving the districts increased opportunities to buy and sell services with the aim of improving provider competition in the health care. Enthoven's ideas influenced government reform proposals by the end of the 1980s.

Thatcher's policies were characterized by selective budget cuts, while Reagan's were more of across-the-board cuts.
The introduction of insurance-financing of health care was discussed in the UK., but finally the Thatcher government decided to keep the system of public tax financing of the health care, not the least because of cost concerns. In the U.S., Reagan, however, cut virtually all health, welfare and other social programs.

Maynard has noted that while the problem of inefficiency in the health sector is ubiquitous, the problem of inequity in the health care system is more pronounced in the U.S. than in the European countries.[8] Sixteen percent of the GDP in the U.S. is now spent on health care, still access to health care is problematic for at least 44 million Americans.[9]
Over three dozen health care reform proposals were considered by the U.S. Congress in the last decade. A group of opinion leaders, the Jackson Hole group, provided an insightful analysis of why competition failed to improve the efficiency and equity of the U.S. health care system in the 1980s. This critique was complemented by reform proposals, where again Enthoven was the leading designer. The reform proposals aimed for universal health insurance coverage, improved competition between health insurance providers, a 'tax cap' on deductions for health insurance and the establishment of a national system of sponsor organizations as collective purchasing agents. No radical reform proposals were, however, accepted in the end.

3.1.4 Income Inequality and Economic Growth

It is no surprise that income inequalities increased sharply in the U.S. and U.K. during the Reagan-Thatcher era. The widening of income and wealth disparities was more acute in the U.S. and U.K. than in other industrialized countries in the same period. Income inequality in the U.S. decreased from 1929 to 1969, but then started to increase. In 1969 the income of the top quintile was 7.5 times that of the bottom quintile, a difference much wider than in European countries, but in 1992 the multiple had increased to eleven. In the U.K. the multiple increased from four in 1977 to seven in 1991. The 'Economist' linked the increasing inequality in the U.S. and U.K. with the government policies of cutting taxes and welfare benefits.[10]

Economists have long nourished a popular notion of a trade-off between income equality and economic growth. The theoretical basis for this is that income differences represent incentives and rewards that are thought to stimulate development in a society.

This is expressed in the so-called *Kuznets curve*, which is a graphic illustration to the hypothesis that income inequality first increases and then decreases with development.

This hypothesis appears, however, not to be borne out by empirical evidence. Persson and Tabellini analyzed two sets of empirical data, one set going back to the 1830s covering nine OECD countries and one set of post-war data covering 56 countries, including developing countries. They found that income inequality was negatively correlated with subsequent growth in democratic societies. They also found some support in the OECD data, although weak, for the hypothesis of a two-way link, that inequality is linked to an expansion of government re-distributive policies, which, with a certain time lag, are correlated with economic growth. Their results led them to conclude that income inequality is harmful to economic growth.[11]

3.1.5 Structural Adjustment Policies and Health Reform

The purpose of the structural adjustment policies (SAP) pushed by the Bretton Woods institutions was to address the impact of global recession, to expand trade and to reduce fiscal imbalances. The advocates of adjustment policies have usually argued for growth-oriented adjustment, expressed as adjustment with appropriate concern for the needs of vulnerable groups. Unfortunately, the results of adjustment policies speak another language. Unicef was an early critic of these programs. In 1987 Unicef published a study 'Adjustment with a Human Face' which documented the disturbing effects of the adjustment policies on basic health, education and social services for vulnerable groups.[12]

Around the same time the World Bank started changing the orientation of its programs in developing countries, gradually moving away from large-scale infrastructure and industrial investments into the soft sectors; health, social welfare and education. One of several reasons was the criticisms against the environmental and social impact of some of its investments. Another reason was that it was becoming easier to find private sector financing for profitable industrial investments, while, also as a reflection of the structural adjustment policies, governments were finding it increasingly difficult to finance investments in basic human development.

In 1987 the World Bank published a policy document 'Financing Health Services in Developing Countries: An Agenda for Reform', which outlined the ideology supported by the Bank at the time.[13]
The 'Agenda for Reform' identified three key problems in the health sector in the developing countries and advocated four main policies. The three critical problems were; insufficient spending on cost-effective programs, low internal efficiency of government supported programs and inequitable distribution of the benefits of the health programs.

The document suggested four policies to remedy the deficiencies of the health sector; charging user fees in government facilities, encouraging health insurance or risk sharing, removing restrictions on privatization and decentralizing government services.

It is evident that the World Bank policies were based on a neoclassical economic philosophy and reflected the U.S.' tradition rather than the tradition and values of the European welfare states.

The policy document signaled little concern for the poor and how the implementation of the policies would impact on their access to vital health services. It was e g optimistically stated that 'Ironically, in some cases the poor may be better protected in the private sector. A sliding scale of fees, with a low charge or even none for the poor, is common on an informal basis at missions and at the village level, where the individual's ability to pay is known.' and 'Some of the previous suggestions - such as higher fees for private and semiprivate accommodation in public hospitals and free or low-cost care at higher level facilities for patients referred from a lower level – also implicitly protect the poor.'

The document provided hardly any reflection on what would be the impact of the policies on the composition of health services, e g whether curative services would benefit and preventative services be punished in a fee-for-service based health system and how to protect essential public health services like immunization and qualified delivery attendance in a decentralized, privatized and fee-funded system.

The World Bank and the IMF commissioned studies in the late 1980s to refute the conclusions from 'Adjustment with a Human Face' that the structural adjustment policies had had a detrimental impact on social welfare. However, in a qualitative interview survey of fifty-six health professionals in Jamaica, Lundy concluded that almost all had observed a seriously declining standard of public health in the last decade (1982-1992), which many attributed to Jamaica's debt crisis and specifically to the structural adjustment policies.[14]

3.1.6 A New Agenda for Health Reforms?

The second evaluation of the WHO/EURO strategy for Health For All by the Year 2000 rated the progress towards the first target 'Equity in Health' as 'Little or none'.[15] [16]

In May 1998 the fifty-first World Health Assembly adopted a World Health Declaration, reaffirming the commitment of the member states to the principle that the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being. The Declaration recognizes that the improvement of the health and well-being of people is the ultimate aim of social and economic development and places a high priority on '*the ethical concepts of equity, solidarity and social justice and to the incorporation of a gender perspective into our strategies*' to achieve the goal.[17]

WHO and Sida has joined to call for more attention to equity in health and health care and a renewal of the Health for All strategy (Initiative on Equity in Health and Health Care), including a strong commitment to reduction of poverty and its health consequences.[18] Sida and Rockefeller Foundation are jointly funding the Global Health Equity Initiative which supports in-depth country analyses and conceptual studies on equity in health and health care, policies to reduce inequities and the policy context surrounding health inequity.[19]

3.2 ADJUSTMENT AND HEALTH REFORM IN CHINA

3.2.1 From Maoism to Dengism

The Chinese Minister of Health, in a recent interview, highlighted three priorities for the Chinese health sector and the health of the Chinese people. The first was to emphasize the importance of prevention. The second issue was equity, noting that the gap in access to health services was becoming too big, not only in China, but worldwide. The third was to intensify the efforts to control and eradicate major diseases.[20]

The postwar political development in China can broadly be divided in two very distinct phases; the Maoist period from 1949 to 1976 and the Dengist period from 1978 onwards. The decade from the late 1960s until December 1978, when Deng Xiaoping established himself as the supreme ruler, were plagued by power struggles.

The Maoist period was characterized by anti-market ideology, extreme egalitarianism and an emphasis on the needs of the rural population. For the health sector the ideology was bluntly expressed in Mao's statement of June 26, 1965;
'Tell the Ministry of Public Health it only works for 15% of the entire population. Furthermore this 15% is made up mostly of the privileged. The broad ranks of the peasants cannot obtain medical treatment and also do not receive medicine. The Ministry of Public Health is not a people's ministry. It should be called the Urban Public Health Ministry, or the Public Health Ministry of the Privileged, or even the Urban Public Health Ministry of the Privileged.'
'A vast amount of manpower and materials have been diverted from mass work and are being expended in carrying out research on the high-level, complex and difficult diseases, the so-called pinnacles of medicine. As for the frequently occurring illnesses, the widespread sicknesses, the commonly existing diseases, we pay no heed or very slight heed to their prevention or to finding improved methods of treatment. It is not that we should ignore the pinnacles. It is only that we should devote less men and materials in that direction and devote a greater amount of men and materials to solving the urgent problems of the masses.' [21]

In spite of Mao's critical comments, China achieved, in the Maoist period, quite impressive improvements in the protection of the health of the rural population. In the late 1950s the network of three-tier curative services (county hospital, township hospital and village health station) and preventative services (MCH hospital, anti-epidemic station, family planning center) was introduced. The government invested in the training of three types of rural health workers; general medical and health workers, pediatric health workers and midwives.
The barefoot doctors served as the foundation of rural health care, which made basic preventative-oriented health services available and affordable for almost all citizens. Infectious diseases, including sexually transmitted diseases and endemic parasite infections were combated with the help of mass movements organized through the National Patriotic Health Campaign.

Basic rural health care and prevention was financed from the collective economy through the Co-operative Medical System (CMS), which covered almost all villages of China at its peak by the end 1970s.

Chinese citizens have a constitutional right to equitable access to health services. Article 45 of the Chinese Constitution stipulates: '*Citizens of the People's Republic of China have the right to material assistance from the State and society when they are old, ill or disabled. The State develops the social insurance, social relief and medical and health services that are required to enable citizens to enjoy this right.'*

Most observers agree that the health results in the first thirty years of the People's Republic were far better than what could be expected after a century of civil war and foreign aggression.[22] [23]
The World Bank concluded, in an assessment of China's health system and its past progress, that; '*The achievements have been far beyond what could be expected for China's stage of economic development and are termed the First Health Care Revolution. It was firmly founded on a broad, publicly financed and conducted disease prevention strategy, coupled with accessible primary health care. Such successes in the control of infectious disease mortality far exceeded what has been achieved in many other developing countries.*'[24]

The Dengist period represents a modernization of China, a commitment to the market philosophy and an acceptance of widening gaps in income and wealth between the coastal areas and the interior of China. The rigid price controls that characterized the Maoist period were lifted. Within little more than a decade from 1979 around two thirds of all consumer goods, in terms of sales value, had been deregulated. The market replaced political decision-making in resource allocation and priority-setting.[25] Subsequently, the Chinese economy has consistently grown faster than any other economy in modern time. The increasing inequalities and social and economic divisions between urban and rural areas are seen as temporary phenomena, unwanted, but unavoidable side effects of vigorous growth.

3.2.2 Poverty in China

Gustafsson and Zhong have demonstrated, based on data from two large household surveys, that poverty in China is closely linked to location. There are important differences between urban and rural areas, but the difference between the more prosperous East China and the poverty stricken West China is even more pronounced. In the period from 1988 to 1995 poverty clearly decreased in East China, while it slowly increased in West China. The researchers also noted that most of the overall mild reduction in poverty was explained by the (official) decrease in family size.[26] One implication is that, if official data underestimate the true fertility in China, even the overall mild reduction of poverty in China would come into question.

Gustafsson and Li in another analysis, based on the same survey data, examined the gender earnings gap in urban China and observed that the gap was small, but increasing.[27]

3.2.3 The Chinese Health Reform

The Dengist deregulation of the command economy and price controls extended to the health sector.
The Dengist health reform encompassed;

- reductions of public financing and increased scope for fee-for-service revenue,
- decentralization of management responsibilities,
- introduction of incentives for hospital management and doctors in the form of bonus systems,
- reform of the health insurance systems,
- reform of the barefoot doctor system and
- a reform of medical price system.

The agricultural reforms led, inadvertently, to a near total collapse of the Co-operative Medical System in the rural areas.[28] [29]

In the Maoist period most of the government revenue came from state enterprises. As the economy was reformed, the share of the state in the economy decreased. The state enterprises increasingly became a liability with their incompetent management, outdated line of products, recurring losses and debt-burdened balance sheets. During the 1980s the public budget revenue decreased considerably. Central and local government revenue decreased from more than thirty-four percent of the GNP in 1978 to less than twenty percent in 1992. In 1987-88 the provinces had to cut their expenditure on health care by 18%. The Ministry of Health reduced its small support to village doctors by 45% in real terms from 1979 to 1987.[30] Simultaneously, the cost to the government for the health insurance for government staff (Gongfei) increased by 30% annually.[31]

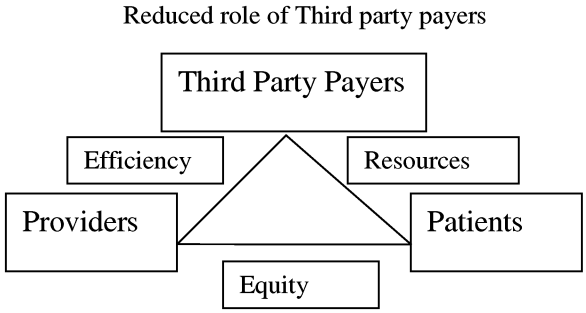
From 1980 hospitals were allowed autonomous decision-making over revenue surpluses. In May 1982 the central government allowed some enterprises to try new methods to reduce medical costs. In 1983 a dual price system was introduced, where hospitals were permitted to charge more for patients covered by government health insurance (Gongfei) or enterprise health insurance (Laobao) than for out-of-pocket paying patients. From around 1985 the CMS started to fall apart, as a result of the privatization of farming, the so-called contract system. CMS survived only in a few relatively affluent counties in East China.

In March 1988 a reform research group was set up to review the (Gongfei) medical insurance system. The group produced a draft titled 'A Plan to Reform the Medical Insurance System'. Four cities were chosen in March 1989 as trial areas.
According to a statement by Dr. Chen Minzhang, then Minister of Health; '*the way to reform the free medical care system is to change it into a comprehensive social medical insurance system, strengthening gradually people's 'sense of cost' and getting more efficient use of the state's medical funds.'*
The statement implied that the 'free' government health insurance system (Gongfei) would be replaced by a social health insurance system, with considerable co-payments and/or co-insurance. A key objective was better control of the rapid escalation of costs in the government health insurance system.

In 1985 the pricing of medical services was reformed to allow hospitals to charge full cost, including depreciation, for new services and new technologies. In the period 1985 to 1989 the medical price levels were increased gradually for all services to cover full cost, except labor costs. In 1992 the dual price system was abolished. For preventative services, MCH and immunization, the share of costs covered by public funds decreased. The balance had to come from fees or pre-payment contracts.[32]

Figure 1 illustrates how the essential elements of the Chinese health reform impacted on the supply and demand for health care services from the mid-1980s. It is notable that in China, contrary to the development in many other countries, the role of third party payers, was greatly reduced in the health reform. The Chinese health reform has left the ownership of hospitals and major facilities in public hands, but the financing of rural health care has, in effect, been privatized.

Figure 1, Health Reform in China, mid-1980s



Supply side:
Hospital management autonomy
Bonus incentives
Revised medical prices
Fee-for-service revenue increasing
Public budget financing decreasing

Demand side:
CMS disintegration
Reform of health insurance
User fees

4 THEORETICAL FRAMEWORK

4.1 EQUITY OUTCOMES

The purpose of this chapter is to review the theoretical structure of equity studies, separating outcome and causal variables, aiming to put the studies in this thesis in a perspective.

Equity is defined as 'fairness', 'right judgement', 'principles of justice outside common law or statute law, used to correct laws when these would apply unfairly'.[33] Equity thus has an ethical and moral aspect, which equality lacks. Clearly, this moral and judgmental aspect of equity, can create problems in operationalizing the concept.

There are relatively few studies in the developing countries on equity in access to services and even less research on equity in health.[34]

4.1.1 Equity in Health

If there is consensus on the objective of equity in health status, there is less clarity on how to reach the objective and even less on how to assess progress.[35] The Technical Seminar on the measuring of health inequalities, preceding the World Health Assembly in May 1998, noted that one of the major challenges in the current discussion on equity (in health status) is to make the concept operational. A framework of three dimensions for measuring differences was suggested.

- *Impact versus effect measures.*
  The effect measures, e g relative or attributable risks, incorporate only the differences, in terms of ratios or absolute measures, between the highest and lowest socio-economic groups. The impact measures, on the other hand, include not only the effect, but also the actual distribution of the population among the different groups.
- *Relative versus absolute measures.*
  The relative measures are expressed in terms of ratios; e g the outcome of the highest socio-economic group in relation to the outcome of the lowest socio-economic group, while the absolute measures indicate the difference in terms of the unit of health outcome.
- *Simple versus sophisticated measures.*
  Sophisticated measures are making use of more complex statistical methods, e g regression analysis. It was noted that the results of sophisticated and simple methods often were similar. [36]

Studies on equity in health are typically related to differences, absolute or relative, in socio-economic status (SES) and either compares the trend in one geographical setting or compares differences between geographical locations.[37 38] The differences in health status in relation to SES are usually termed the *gradient* in health. The Black Report, published in 1980, in the U.K. was an influential early work on inequity in health related to differences in socio-economic status.

The data sources are often available interview surveys, national health or welfare surveys, mortality registries and sometimes specially designed and implemented

interview surveys. When the data come from already available sources, mortality/morbidity at times cannot be linked to the explanatory variables at individual level. In such cases the analysis has to be made at geographical level, so-called ecological studies, which have less validity.

The outcome measure may reflect functional ability, e g in response to survey questions as to what extent the illness limits the daily activities of the respondent. Functional ability is sometimes used as a proxy for severity of illness. Other indicators of severity of illness are absence from work or absence from school.[39]

The methodological difficulties are plentiful. If the comparison is between different locations, there will be differences not only in disease patterns, but also in cultural concepts and perceptions surrounding illness and disease. Often relevant data are missing, inadequate or unreliable. If available data are used, there are frequently differences in the methods of data collection, which cause problems with the validity of the results.

If time series data are needed, the measurements should be repeated at regular intervals, which will require efforts to sustain the organization and methodology over time.

Often illness, self-reported (subjective) health status is used as the outcome variable. Simple straight-forward questions have proved sensitive to differences in socio-economic inequities, like 'How is your health in general: very good, good, fair, poor or very poor?' and 'Do you suffer from any long-standing disease or disability?'[40]

An argument for using an illness measure, rather than a disease, clinically defined, (objective) measure, has been that illness better represents the well-being of an individual than a doctor's diagnosis.[41] Self-reported illness could reasonably be expected to be more reliable when it relates to chronic conditions, than when it relates to acute conditions.
On the other hand it can be argued that illness is an arbitrary measure, which will place individuals with the same symptoms of disease in different categories. It may happen that a person, who is lacking discernible symptoms of disease, self-reports as ill, while another person, objectively in a worse condition, self-reports as healthy. Amartya Sen has pointed out the complexities of using self-perceived health measures, by noting that frequent use of health care services tend to result in a worse perception of own health. Going by self-reported health, Kerala would have the worst health status in India, while states like Bihar and Uttar Pradesh would be in the lead, which is a counter-intuitive result.[42]

On the other side of the argument are the anthropologists who question the positivist, objectivist point of view. It is argued that objectivism tend to give preference to reliability over validity. Anthropologists emphasize the *position* (context) of the studied population and the relation between the position of the study population and that of the researcher. The philosophical premise being that social change cannot be validly assessed without assessing the contextual meaning for those who experience it.[43]

4.1.2 Equity in Health Care Utilization

Access or utilization of health care services can be seen as an intermediary variable, where the anticipation is an outcome of improved or sustained health or survival. The assumption is of course that the consumption of health care services contributes to better health, health protection or life extension. At the same time it may be argued that health care services have an intrinsic value. If the purpose of the services is to inform the patient, to give comfort, relief and general care, then the services may have a value for the patients, regardless of direct effects on morbidity or mortality.

Health care utilization is a commonly used proxy indicator for equity in the access to health care. Puentes-Markides notes that equity and access are two concepts that policy makers have a hard time defining and even harder implementing. Equity has moral and ethical dimensions and is related directly to the objectives of access and availability of health care for all.[44]

Barnum and Kutzin define equity as involving interaction of the risks of illness across different social groups, the availability and use of services for the illnesses and the ability of different groups to pay, a definition incorporating both inequity in health and inequity in access to care.[45]

Pauly defines equity as associated with minimizing harm from under-consumption of medical care.[46] In the U.S., the President's Commission on Ethics defined equity as not a ceiling but rather a floor below which no one's consumption should be allowed to sink. In Northern European countries and in Canada there is more emphasis on equality of access per se, rather than simply improved access for the needy. The Canadian system made it illegal to insure privately to complement the publicly insured services.

Equity in access/utilization needs to be discussed in relation to some theory of fairness in the distribution of health services.

At least five basic ethical positions in relation to access to health services can be identified from the theoretical literature.[47 48]

- *Entitlement or libertarian theory.*
  This position suggests that individuals are entitled to whatever rights and benefits that they presently have, which in practice makes equity analysis irrelevant. This theory reflects Locke's natural rights to life and property. People should have a right to hold property and other entitlements and to transfer them as they please, as long as they are not violating other people's rights. Close to the libertarian theory is the merit theory, implying that social justice is achieved when each receives rights and entitlements according to their merits.
- *Utilitarian theory.*
  This represents the neoclassical, free-market theory and holds that the greatest sum of benefits for the population represents the optimum. It is usually applied in efficiency analyses. The criticism against the utilitarian theory is that it is not concerned with distributive aspects.
- *Maximin theory.*
  The maximin theory is sometimes formulated as the goal to maximize the

minimum, or in other words that the measure is how well the worst-off are faring. It is based on Rawls' theory of justice, with its two principles of social justice, that individuals should have the maximal liberty compatible with the same degree of liberty for everyone and that deliberate inequalities are unjust unless they work to the advantage of the least well-off.

- *Egalitarian theory.*
  The egalitarian position is that all should be equal, which perhaps is utopian, but certainly reduces methodological issues.
- *Marxist theory.*
  The Marxist position is that distribution should be according to needs

As discussed in previous chapter, health economists tend to see a trade-off between equity and efficiency in health systems. Efficiency is by itself not an unambiguous concept. There are several dimensions of efficiency. Technical efficiency refers to getting the maximum output for a given input or producing a fixed output with a minimum of inputs.[49] External efficiency relates to doing the right things, while internal efficiency relates to doing it right. Efficiency is usually measured by means of cost-effectiveness, cost-utility or cost-benefit analyses. Efficiency, similar to equity, has ethical dimensions, although not as obvious. Culyer, in a discussion of the morality of efficiency in health care, concludes that efficiency can be seen as highly ethical, but only as ethical as the objective which is being pursued efficiently.[50] He also argues that it is unethical to ignore costs both at the system design level and at the personal micro-level of doctor-patient relationship. His proposition implies that the ethical aspect of efficiency is even more acute in developing countries.

Taylor argues that equity and efficiency can be mutually supportive, by noting that international experience demonstrates that equity is not only morally right, but that it also can help make primary health care effective and efficient.[51]

Two broad, rivaling ethical bases for evaluation of health services utilization appear from the empirical literature. The first is close to the libertarian theory and considers access to health care as essentially similar in ethical respects to access to other goods. The second ethical basis is closer to the egalitarian or Marxist theories and regards access to health care as a right of citizenship like the right to vote which should not in any way depend on individual income or wealth. This second ethical basis is clearly the predominant viewpoint in most European countries and in Canada.

The first ethical basis is linked to the theoretical construct termed welfare economics. Except for the name, welfare economics has little to do with the concept of the welfare state. It is more connected to liberal political opinion. A basic (and obviously oversimplified) assumption in welfare economics is that the sum of individual welfare in a society is made up of the aggregate consumption of goods and services by all members of the society.
Extra-welfare economics goes beyond the traditional theory by also including non-goods characteristics of the individuals, like happiness, pain, freedom etc in the welfare measure. The Pareto condition for efficiency refers to reaching the optimum welfare distribution of goods and services, when no one could be made better off, unless another individual is made less well-off, within the given financial constraints and

given the income distribution. Constrained Pareto efficiency refers to reaching Pareto efficiency, given the existing market structure. A fundamental assumption behind the Pareto criterion is that each individual knows best his/her own interests and will spend the available income accordingly.[52]

However, the relevance and applicability of welfare economic theory to the issues of the health sector are limited by certain specific characteristics of the health sector, which are commonly referred to as *externalities*. Externalities refer to effects which go beyond that individual, when he or she consumes a certain good or service. A positive externality is e g to be found in the public benefits when an individual vaccinates against an infectious disease. Not only the vaccinated person benefits, but also all other individuals, who otherwise would have been infected by him or her. Another type of externality in the health sector, is the phenomenon that our well-being may increase when we see others being cured, surviving and healthy, which is the basis for a willingness to contribute to the cost of others' health care.

The health sector is also affected by other market imperfections, e g *adverse selection* and *moral hazard*. Adverse selection is related to the asymmetry of information, which occurs when the patient knows better his/her health problems than the insurance company. Moral hazard refers to the situation when an individual covered by health insurance demands more health services or is exposing him/herself to higher risks, because the financial burden is shifted to others. *Supplier-induced demand* is the term for the phenomenon that the utilization of health services is often not decided by the patient, but by the physician. When physicians prescribe more or more expensive procedures or drugs, than what is clinically motivated, the assumptions for the Pareto optimum are invalidated.

Amartya Sen has, from a theoretical perspective, questioned the relevance of traditional welfare economics. He argues that the normative properties of welfare economics have played a remarkably restrictive role by imposing severe restrictions on the type of information that can be used. One point he makes is that in aggregating the conflicting interests of the poor versus the rich it is, in effect, not possible to give preference to the poor.[53]

It is not long ago that health economists argued for keeping the issues of efficiency and equity separated, thinking that equity issues were political and thus the responsibility of professional politicians, while health economists should focus on efficiency-promotion. Drummond pointed out, however, that it is not possible to duck the equity issues. Even 'cost-of-illness' studies, which are typically seen as efficiency-related, have equity implications, by the discounting to present value of the losses of future earnings, which is giving higher priority to the income-losses of the rich.[54]

Most of the empirical studies of inequity in access to health services have examined utilization of aggregated health services in relation to income categories. A few studies have looked at utilization in relation to gender or geographical access. Age is usually recognized as an important influencing variable, but is often eliminated in the analysis by age-standardization.

The outcome measure is sometimes number of visits for outpatient services and number of bed days for hospital services. A more informative measure, and theoretically more appealing, is the consumption of medical resources, or in other words the *cost of the services*. Costing, may for the uninformed seem a simple, technical and straightforward exercise, but is in fact a complex procedure involving value judgments. A basic observation is that the same costing methodology must be applied for all the alternatives or different categories under study. In a location where all or almost all services are charged on a fee-for-service basis, the actual fees may be used as proxies for costs. This is the case in rural China, which obviously simplifies data collection and analysis. If, however, the price system is warped, the outcome measure may not represent a 'true' measure of resource consumption.

A costing exercise normally involves at least six distinct activities. First, identification of what resources; material and services, are used in the process. Second, it must be established which materials and which services can be directly attributed to the cost item and which can only indirectly be attributed. Third, the number of units of the directly used materials and the time directly spent by different categories of staff must be measured. Fourth, a value in money must be affixed to each unit of materials and services. Fifth, the indirect costs should be allocated by the use of an allocative key, e g the cost of hospital premises could be distributed according to the floor space for each department and then added to the cost of each service according to the staff time spent on the procedure. Finally, depreciation costs for the use of major capital investments need to be allocated.

Most of the published studies have analyzed utilization in relation to socio-economic status, but without consideration of medical need, which is known to differ across socio-economic groups. There are few studies from developing countries and none from China measuring inequity in access in relation to need (health status).

The European 'concerted action' research project (COMAC-HSR) in ten developed countries and the ECuity projects produced a common research protocol and uniform methodologies for cross-country comparisons of inequity in the financing and delivery of health care. The COMAC-HSR studies examined vertical equity in the financing of services, i e regressive, proportional or progressive payment in relation to income for the (same) health services, and horizontal equity in the utilization, i e equal treatment for equal needs irrespective of income.[55]
The studies were implicitly based on the assumption that income is the key predictor variable for inequity in the financing and delivery of health care services. The variables sex and age were eliminated as confounding factors.

Household income is, however, an aggregate measure for all the members of a household. Using income as the independent variable therefore carries a risk of missing intra-family differences, related to individual attributes like age, health insurance coverage, educational or occupational status and gender, which are likely to influence health care consumption.

Most of the reported equity studies provide crude estimates with considerable scope for confounding, by using aggregate data for all groups of diagnoses and all types of drugs.

There are few equity studies with analysis across different groups of diagnoses or different types of drugs.

Goddard and Smith observe that the research evidence remains patchy and difficult to interpret and that most empirical studies of equity in access to health care exhibit little or no consideration of any theoretical framework. Many equity studies are vague in operational definitions. Often the authors do not explicitly discuss why they have selected certain outcome and causal variables.[56]

Although the ethical basis reflected in the U.S. health system is clearly different and more libertarian, while the European health systems tend to be based on egalitarian or Marxist values, the empirical work on equity in health care so far seems to be based on a broad agreement that health care should be distributed according to need, reflecting the second type of ethical basis.

4.1.3 Health, Health Care and Poverty

It is in the direction of causality that this dimension of inequity and health differs from the preceding two. Here it is the impact of health status and health care utilization on the incidence and severity of poverty which is the issue, in stead of the influence of income or other measures of socio-economic status on health and access to health care.

The Commission on Macroeconomics and Health surveyed available evidence and came to the conclusion that disease and ill-health act as major constraints to development, keeping school children away from school and preventing adults from earning their income.[57]

Epidemiology has been criticized for having lost its traditional social orientation and in stead becoming mired in statistical procedures and molecular mechanisms in the study of risk factors of less and less relevance. Some of the critics feel that the focus on personal risk behavior may turn the attention away from the political aspects of public health. There have been arguments that e g the focus on consumption, not production, of tobacco have added to the inequalities between rich and poor within wealthy countries and between rich and poor countries.
Rothman, Adami and Trichopolous conclude that while epidemiologists must be free to choose the subject of their inquiries, be it social causes or molecular, they wholeheartedly agree that the study of the social causes of diseases is an important epidemiological goal, and that social causes can explain much of the variation in disease occurrence.[58]

In the post-Thatcher/Reagan years poverty and the situation and perceptions of the poor have returned into focus. In 1990 the World Bank, basing itself on the experiences of East Asia, recommended a two-pronged poverty alleviation strategy; promoting labor-intensive economic growth and investing in the health and education of poor people. The World Bank 1990 World Development Report on Poverty noted that vulnerable groups need the protection of social safety nets, while export-led economic growth was seen as the key to reducing poverty.

In the decade from 1990 to 2000 the views on poverty and the mechanisms involved in alleviating poverty have, however, become more complex and less optimistic about simple solutions. The new broader definitions of poverty require broader sets of actions to fight poverty and also represent bigger challenges in measuring poverty and poverty alleviation.[59]

Amartya Sen noted that poverty is not only low income. Poverty is a basic deprivation of the quality of life and elementary freedoms. Ill health is an aspect of poverty and also constitutive of poverty. [60]

The World Bank's *World Development Report 2000/2001: Attacking Poverty* represented an interesting and new approach in the research methodology for the Bank. Over 60,000 poor men and women in 60 countries across the globe were interviewed to give a voice to their own values and experiences.[61]
Open-ended qualitative and participatory methods were used to gain a deeper understanding of the human aspects of poverty, than offered by conventional poverty statistics.

The results confirmed the multi-dimensional nature of poverty and the importance of non-monetary dimensions. It also documented that poverty is specific to the place and the people it affects. Policies aiming to address poverty need to take the specificity of poverty into account. It will not do to administer the same medicine everywhere, something which IMF and the SAPs have been criticized for.

The powerlessness and the inability to make oneself heard are defining attributes of poverty, qualities which contribute to the difficulties of escaping poverty.
The interviews expressed how poverty affects the well-being in material, social, psychological and spiritual dimensions.

Health was identified as the most important dimension of poverty. Health or 'the body', is the principal asset or tool of income for the poor. When a person is struck by ill health, *the body* becomes a liability, both in the sense that it prevents income-bringing activities and that curing costs money.
Other scarce and important non-monetary assets limiting the possibilities of a change for the better for the poor of the world are; *organizational ability*, the rich being well-connected and the poor systematically lacking essential contacts and networks. A closely linked asset is *information*, it is obviously critical to the ability to earn good incomes to be able to access timely information about market prices and job opportunities. Another potentially limiting asset identified by the poor in the study is *education*, where often the poor cannot afford to send their children to school or to keep them in school. Finally *ideas and entrepreneurship*, are a limiting factor, when there are intellectual property laws protecting the interests of those who can afford the costs of protection, while the ideas, collective experiences and knowledge of the poor are free to be stolen.

An important observation from the interviews is the importance of good governance and the price that poor people have to pay for corruption and bad governance.

The findings from the interviews resulted in policy recommendations in three respects; opportunity, empowerment and security.
Promoting *opportunity* for poor people is about addressing inequities in access to opportunities and information. This can be achieved by legal reforms, expanding the availability of micro-credits, increasing public expenditures on basic social services, reducing financial barriers to access for poor people and expanding access to people in remote areas. *Empowerment* is about improving the functioning of state and social institutions by e g reducing corruption, removing bureaucratic and social constraints and by making public institutions more responsive to the needs of the public.
Security is about protecting public expenditures on programs that are important for vulnerable groups, obviously including social insurance and unemployment benefits.

There is thus a growing consensus that ill health not only has financial consequences, which can be more severe for the poor, but also that ill health by itself constitutes a fundamental non-monetary dimension of poverty.
There are, however, still surprisingly few publications on the relationship between health, health care and poverty, both in terms of theoretical and empirical studies.

In one of few studies, Wagstaff and Van Doorslaer developed an index for catastrophic illness to capture both the incidence and the intensity of catastrophic illness in Vietnam. The study also aimed to assess whether or not the catastrophic illnesses affected the poor disproportionally. They found that the incidence and the intensity of catastrophic events were reduced between the years 1993 and 1998 and that the concentration among the poor diminished. Another conclusion was that the increase in poverty was not related to hospital expenditures.[62]

In my view there are important shortcomings in the study by Wagstaff and Van Dorslaer. First, there is no discussion as to whether or not the different income categories were affected by different health problems or different degrees of severity of illness, which is a commonly known phenomenon. Second, and even more important, the results are likely to be biased, in the direction of an underestimate of the impact on the poorer households, due to the adaptation of the households to the costs of medical fees. The authors note that in the period from 1993 to 1998 hospital fees increased by over 1000% in real terms in Vietnam. Clearly, this would have a more deterring effect on the low-income groups. Yet, the outcome measures are only in monetary terms, based on out-of-pocket expenditures, ignoring the risk that low-income groups would be barred from access to vital services. This will not give an unbiased estimate of the frequency of health problems, since an unbiased estimate can only be obtained if the probability to seek care for the same severity of illness is the same across the income groups.

4.2 CAUSAL FACTORS ASSOCIATED WITH EQUITY

4.2.1 Financial Variables

4.2.1.1 Income and Wealth

Income, educational level and occupation are the three most commonly used independent variables in equity studies as an indicator of socio-economic status. Income is usually measured at household level, which implies that it may conceal intra-familiar differences.

Income can be measured as;
- gross income, including all income components and before tax deductions,
- net income, after deductions for tax and social contributions or
- after adjustment according to age of children and family size (equivalence scale).

There are various methods for the calculation of household equivalent income, which for some countries have become standardized.[63]

For intra-country comparisons, it is of course reasonable to expect that national standards are used to define income, but when comparing across countries, the same methodology should be used for all countries, irrespective of national standards. There are arguments for and against the different types of income measures. The important criterion is, however, the consistent use of one definition.

Although income is an important and commonly used independent variable in inequity studies, most reports are brief in discussing methodology and assumptions related to the definitions.

4.2.1.2 Health Insurance

A second important financial variable, directly related to access to health care, is health insurance.
Comprehensive health insurance plans developed in Europe more than a century ago, initially in the context of guild associations and the growing labor movement. In the developing countries health insurance systems have been slower to develop. Social health insurance schemes are rare to find in developing countries, but have been suggested as a key to implementing the Health for All strategy in developing countries.[64 65]

There is a wealth of literature on health insurance and also on the absence of health insurance, out-of-pocket financing of health care services, theoretical and empirical works, from rich countries and to a lesser extent from developing countries. Most of the literature from developing countries is focused on the efficiency aspects of health insurance. The equity impact of health insurance is less frequently covered. There are hardly any published studies of the equity impact of alternative forms of health insurance.

The introduction or expansion of health insurance has been associated with effects on cost (escalation), resource allocation (shifting from preventative to curative services),

medical technology (providing incentives for new technologies) and access (expanding service volume).[66]

In most equity studies, health insurance is a so-called dummy variable, i e a dichotomous (yes or no) variable. Relatively few studies have examined the effects of different parameters in health insurance and even fewer have studied the feasibility of health insurance in developing countries. Yet, the World Bank dismissed health insurance as unfeasible in rural Africa.[67]

In 1987 Unicef supported the launching of the Bamako Initiative, a set of models for rural health care financing, developed by a number of African states. Although the initiative reflects considerable local variation, it is basically built around a revolving fund, controlled locally for community financing of purchases of essential drugs for primary health care. The revolving fund implies that user fees are charged for the drugs and services or that a pre-payment scheme is in operation. The schemes have been evaluated, with mixed results, with questions of affordability, the lack of exemption mechanisms for the poor and the effects of the incentives created by the pricing structures.[68] [69]

The World Bank has based its policy advice on limited and questionable empirical evidence, e g the study by Litvack and Bodart from Cameroon. It reports a pre-post controlled experimental design, where user fees were introduced simultaneously with an improvement of the supply of essential drugs. The researchers found that the utilization increased significantly, especially among the poorest quintile, as a result of the intervention. However, it is not surprising that utilization will increase, if the baseline situation was one where all or almost all essential drugs were unavailable.[70]

One of the most important and influential studies on health insurance and its effects on demand for health care was the RAND controlled health insurance experiment. It was a very costly controlled randomized experiment, carried out from 1974 to 1977 in six sites in the East U.S. The aim was to assess the 'moral hazard' effect of health insurance, i e to see if and by how much demand would increase with the introduction of health insurance. A further objective was to assess if the poor had a different pattern of demand from the rest of the population. A third objective was to assess if price elasticities differed for different types of health services. In particular the research team wanted to find out if less generously covered services, preventative and outpatient services would suffer in relation to hospital-based curative services. A fourth objective was to study if the consumption of health care services would improve the health of the insured population. A fifth objective was related to the growth of Health Maintenance Organizations (HMOs) in the U.S. The research team wanted to disentangle the effects of the HMOs, to analyze if and if so to what extent there was a true reduction in health care consumption resulting from the HMO setup and if such a reduction had health consequences for the participants.[71]
The sample included 5,809 persons and 20,190 person-years plus 1,982 persons in the HMO experiment. The families were assigned to fourteen different fee-for-service health insurance plans or to a pre-paid group practice (HMO). The fee-for-service insurance plans had differing levels of cost sharing and the same upper annual cost

ceiling of USD 1,000. Beyond the upper ceiling all costs were covered by the health insurance plan.
The results were controlled for site, health status, socio-demographic and economic variables and analyzed by a four-equation model of ANOVA.

The key findings were that the use of medical services clearly responds to changes in the amount paid out-of-pocket. Cost sharing mainly affected the number of visits, not the cost of the contacts, indicating that the effects were on the demand side and not on the supply side. Because of the upper ceiling and the fact that 70% of inpatient visits exceeded the ceiling, there were no significant differences between the different levels of coverage for inpatient visits. The use of outpatient services increased with the income of the patients, while the opposite was found for inpatient services.

No evidence was found for beneficial health effects of health insurance coverage, except for the poor adults (the lowest income quintile) who began the experiment with high blood pressure. The results, combined with epidemiological data, indicated a possible mortality reduction of ten percent in the group.

In the HMO sub-experiment the outpatient utilization was not different from the fee-for-service health insurance plans, but the hospitalization rate was one third lower.

One conclusion was that 'moral hazard' from health insurance could only explain a modest part, perhaps one tenth, of the medical cost increases in the postwar years in the U.S. Most of the increase was attributed to technological development and the introduction of new products and procedures.

A deductible on outpatient services not only reduced the cost of outpatient services, but also decreased hospital admissions. Emergency services and preventative services were found to be as price sensitive as other services.

The RAND experiment was extremely costly, USD 136 million in 1984 money value, but it generated unique information. The experiment has to be seen in the context of the political currents of the time. The conservatives in the U.S. preferred to see a high degree of cost sharing in the health sector, believing that this would discourage unnecessary demand and keep medical costs down. Liberals saw cost sharing as a barrier to access for the poor, preventing necessary and medically needed care. Newhouse notes that both could be right, cost sharing could limit both necessary and unnecessary care.[72]

4.2.2 Non-financial Variables

Much of the research work on access to health care has been carried out on the premise that once financial barriers are removed, problems with inequitable access will be resolved. Often there is an implicit assumption that although gender, age, educational, occupational and other social aspects influence access, the non-financial variables are in some way associated with income and may therefore be eliminated in the data collection by *restrictions* or in the analysis by *stratification*.

Based on four surveys of perinatal care in Oregon and four regional consensus conferences Curry identified three categories of non-financial barriers to perinatal care in the U.S.; policy and system related barriers, barriers related to the providers, e g unfriendly, uninformative, long waiting times etc and barriers related to the patients' social situation, beliefs, knowledge and attitudes.[73]

4.2.2.1 Registration

Registration at birth is under-studied from equity perspective, although Unicef has drawn attention to the importance of registration at birth, noting that a high number of girl children are not registered at birth. Registration at birth is a basic human rights issue. Non-registration has obvious detrimental consequences for access to health, social and educational services, yet practically no research has been made on the prevalence and the health impact of the problem.

4.2.2.2 Gender

A Swedish parliamentary inquiry into gender inequity in health care noted that there are gender differences in health and in health care utilization. A literature review identified a lack of gender research in mental health care. The meeting and interaction of patient and caregiver was identified as a priority area for research, which could be undertaken with qualitative and participatory methods.[74]

Research on the gender aspects of health is a relatively recent phenomenon. Gender and sex differences related to tuberculosis have been demonstrated. Long and Johansson used both qualitative and quantitative methods and found differences in the perception of the disease, the prevalence of symptoms, care seeking, access to care, recovery rates and symptoms after treatment.[75 76]

4.2.2.3 Age

Age is another non-financial variable, known to influence both health status and health care utilization. The effect of age is oftentimes eliminated in the data collection or in the analysis.

Williams has discussed inter-generational equity in health and the concept of 'fair innings'. Williams is noting that (inter-generational) health inequalities persist, although there is almost universal agreement that they are deplorable. Attempts to quantify equity are rare, often justified by the conflicting ethical principles related to equity. The World Bank's World Development Report 1993 represented a bold attempt to quantify inter-generational equity in health for the purpose of rational priority setting. In the calculation of DALYs (Disability-Adjusted Life Years) the number of years of life lost were calculated according to an arbitrarily decided norm of 80 years life span and arbitrary weights were given to the life years according to the age of the person. Williams concludes that although the details of the calculations are debatable, putting explicit values to years of human life should not be taken for lack of humanity, since quantification has a potential of clarifying the issues.[77]

4.2.2.4 Education

Education is sometimes used as an indicator of socio-economic status and is generally known to co-variate with income. However, it is also established that e g education of women has an important child survival impact, an effect independent of income. Higher educational level is associated with better nutritional habits and healthier life style.

4.2.2.5 Occupation

Occupation is another non-financial variable which at times is used as a proxy for socio-economic status. It is well established that the health status differs across occupational groups, although the patterns have changed over time. In Sweden, e g the public employees have gone from having better than average health to a worse than average status. Also the type of occupation-related health problems tend to change over time.

In China, the large group categorized as *'farmers'* should not be seen as farmers in a European context. A more appropriate label for this occupational group could be 'non-formal sector workers', as they in general are non-employed or temporarily employed small-scale garden farmers.

4.2.2.6 Geography

Geography, in terms of distance, quality of roads and terrain, can obviously have an important influence on access and utilization of health care.

In China, Henderson and colleagues found, based on an eight-province survey, a very good geographic distribution of clinics and other services and a high level of utilization of the facilities.[78]

5 AIMS

5.1 GENERAL OBJECTIVES

The aim of the thesis is;

- to assess equity in the provision, financing and utilization of health services in the study counties, after the launching of the Chinese health reform, in relation to income and health status,
- to assess equity in utilization, financial barriers to care and poverty impact and the association of financial variables; alternative health insurance systems and out-of-pocket financing and the association of non-financial variables; gender, age, education, occupation and geographical distance to health facilities.

The original plan was to carry out the research in four counties. The selection of the counties was based on convenient travel distance from Shanghai and existence of established cooperation with Shanghai Medical (Fudan) University. The first study, the expenditure review, (Paper I and II) was undertaken in the two counties in Jiangsu province, which were the first to agree to participate. Since participation in the project involved staff time and administrative support with unclear direct benefits, there was some understandable hesitance from the counties to participate, but eventually all the contacted counties agreed to participate and the scope was extended to six counties. One reason for increasing the number of participating counties was that since the first two counties had a higher than average GNP level, we wanted to include counties with average or lower than average GNP levels.

The original aim was to study four dimensions of equity; economical, geographical, gender and age.
Six indicators were planned in the original design of the project; delivery care, family planning services, tuberculosis, iron deficiency anemia, hypertension and antibiotics utilization. The indicators were selected to reflect both poverty- and affluence-related conditions. We have collected data related to the planned indicators as well as on immunization of children, schistosomiasis and bronchitis, although we have not had sufficient resources to do all the analysis as originally planned. Dong Hengjin's thesis covered the use of pharmaceuticals and antibiotics.[79] This thesis includes analysis related to delivery care (Paper VII).

In some studies, the criteria for equity is equal distribution independent of income (Egalitarian ethics), without taking stock of need. When equity in access to health care is assessed according to the criterion 'equal treatment for equal needs' (Marxist ethics), a somewhat more sophisticated analysis is required. This is sometimes referred to as *horizontal equity* in utilization or provision of health care.

There are various definitions of what *equity* (or inequity) in health care utilization involves. In most studies the outcome measure is expenditures, although ideally the outcome would incorporate quality aspects of the care. Expenditure can be a problematic measure if the price of a certain service or drug differs substantially between locations. It would yield the peculiar result that the same amount of expenditure would indicate different levels of care. This is in fact a problem afflicting many published equity studies. In our study, we believe this problem is not serious, since medical prices were and still are regulated in China.

Equity in the financing of health care utilization is usually analyzed according to the criterion 'paying at least in proportion to income', which is referred to as '*vertical equity*' in the financing of health care.

The thesis builds on the definition of equity formulated by Barnum and Kutzin: '*involving interaction of the risks of illness across different social groups, the availability and use of services for the illnesses and the ability of different groups to pay*'.[80]

The focus of the thesis is on equity in access and utilization of health services. An implicit assumption is that health services contribute to the extension of life, improvement or at least preservation of health.[81] This is an assumption which has been questioned by several authors. Estimations have been made to show that health care only has a limited impact on life extension. It is recognized, however, that health services have an intrinsic value for the consumers, in providing care, comfort and relief from anxiety and anguish.

The thesis builds on a conceptual framework model, modified from Whitehead, which illustrates the circular relationship between health status, health care utilization and socio-economic status (Figure 2).[82]

1. Socio-economic factors influence *morbidity*.

2. Different socio-economic groups may perceive illness differently in terms of need for care.

3. *Need* is not only about people's perceptions of a need for care, but whether health care interventions can do anything useful towards satisfying their perceived need.

4. How need translates into demand is influenced by alternative sources of care (in the family, etc) but also by the health care system itself (supply-induced demand).

5. People may have different knowledge and expectations of care, culturally-related preferences and therefore differential *demand*.

6. The actual translation of demand into care is dependent on supply, as well as different factors influencing access, for example economic, geographic, cultural and organizational factors.

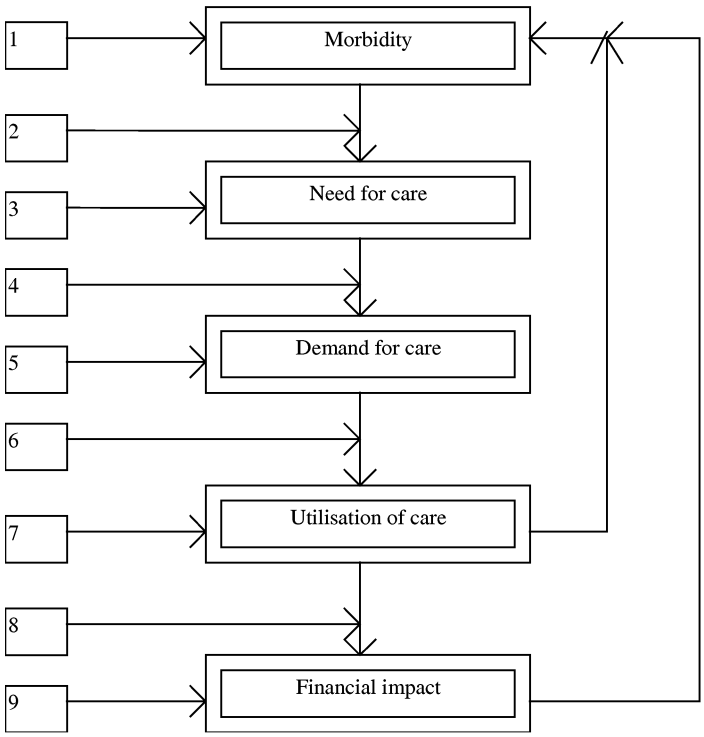
7. The actual pattern of *utilization* of care will depend on the health care structure and internal organization. Completing the (first) loop, utilization influences morbidity and the meaning of 'need' related to this fact.

8. The cost of care impacts differently depending on the design of the health financing system and the socio-economic characteristics of the society, the household and the individuals.

9. The *financial impact* will differ for different disease categories and different socio-economic groups. Completing the second loop the socio-economic impact will influence morbidity in ways that may reinforce or counteract the effects of care utilization.

Whitehead's model includes items 1-7, I have added 8 and 9.

Figure 2, Model of framework for analysis of equity in health care (modified from M Whitehead, 1997)



The definition of equity involves examination of the full circle of the model, *the morbidity, the need, the demand, the utilization* and *the financial impact*, across different socio-economic groups and different diagnoses.

5.2 SPECIFIC OBJECTIVES

5.2.1 Health Care Expenditure Review

The aim of the expenditure review was to review and analyze health sector accounts data with health insurance and out-of-pocket financing as independent variables and health care expenditure, curative care expenditure, tertiary care expenditure and preventative care expenditure as dependent variables in a natural experimental design, examining the effects of the fee-for service shift in the two counties.

5.2.2 Household Survey

The specific aims of the household survey were;
- to assess the degree of inequity in the financing of health services,
- to assess the degree of inequity in the utilization of health services,

- to assess the strength of association of key socio-economic determinants, with special interest in alternative health financing systems, with utilization of health care
- to assess the financial and health consequences of inequity in the utilization of health care, and
-to identify variables associated with utilization of essential maternal health services, both with respect to trends and cross-sectionally with respect to the association of nine socio-economic variables.

5.2.3 Provider Survey

The specific aim of the provider survey was to describe and analyze providers' perceptions and opinions related to the effects of health care financing on the provision of care.

6 METHODS AND DATA

6.1 HEALTH CARE EXPENDITURE REVIEW

The health care revenue and expenditure review was implemented from October 1993 to the summer of 1995 in two counties in Jiangsu province in East China; Jintan and Jurong. Jintan and Jurong were purposely selected as two neighboring 'twin' counties with similar socio-economic environment, demographic and health status, geographic, cultural and educational conditions as well as political and regulatory environment, but with different health financing systems.

The sources of the data for this study (paper I and II) were interviews with responsible health officials, reviews of available reports, documents and health sector accounts. The amount of funds allocated from provincial, prefectural or county governments was assessed. The fee-for-service systems were examined and the amount of funds raised by user fees was assessed. The purpose was to analyze aggregate revenue and expenditure data for the two counties in a *natural experimental* design with one 'insurance' county and one twin 'out-of-pocket' county.

Rothman describes; …'the "natural experiment". When experimentation is not possible, the ideal circumstances for the epidemiologist are those in which nature contrives to produce the conditions that would have been achievable if an experiment had been conducted. By far the most renowned example, the prototype of all natural experiments, is the elegant study of cholera in London conducted by John Snow."[83]

I John Snow's case the intervention was the supply and the mix of water from two different water companies, the effects of which could be studied at household level. In our case we had a natural experimental situation, where the 'natural intervention' was the health reform, which implicated decentralization of management, reduced public financing of rural health care and increased charging of fees. The effects could be studied in two different settings, one county with health insurance coverage for the majority of the population and one without health insurance.

During a visit in October- November 1993 to Jurong county and Jintan county in Jiangsu province health officials at county, township and village levels were interviewed. Health facilities and practitioners outside the public system were not included in the review. The private sector, NGOs and other non-MoH operators are still insignificant in the Chinese health sector, with the exception of village doctors. The village doctors in Jurong county, who could be defined as private practitioners, were included in the study.
There are hospitals under the administration of other line ministries, e g the Ministry of Defense or the Railway Ministry. Such hospitals were not included in the review.

Jintan county has a comprehensive health insurance system covering the majority (more than sixty percent) of its inhabitants, while Jurong has mainly user-fee based financing of health care. Both counties are relatively well-off by Chinese standards. Jintan county has a smaller population of 541,000 (9% less) with an average GNP per

capita of RMB 6,313 (1994). Jurong has a population of 600,000 and lower GNP level, RMB 5,272 per capita (16% less).
Both counties are far above the national average (RMB 3,679) in terms of GNP per capita, but average level for the province.

The time period for the analysis included the nine years from 1986 to 1994. 1986 was selected as a baseline year, because we see it as the approximate starting point for the Chinese health reform. From around mid-1980s public budgets were slashed and cost recovery was encouraged. Health care management was decentralized, allowing more autonomy to hospital management and revenue-related bonus systems rapidly spread. The agricultural reforms led to the rapid disintegration of the CMS system. Only part of the health care costs, not even the full cost of staff salaries, were paid from public budgets.

'Insurance' in paper I, includes all types of health insurance, both formal sector health insurance (Gongfei and Laobao), CMS and prepayment systems.

The results were significance tested by double-sided Wilcoxon test.

6.2 HOUSEHOLD SURVEY

The household survey (n=5756) was conducted in six counties with a total population of 3,360,000 in three provinces in central China. The survey took place in August and September 1995 (paper III, IV, VI and VII). The response rate was high, 97%.

Key socio-economic characteristics of the six counties are presented in Table 1.

Table 1. Demographic and socio-economic data of six survey counties

1994	**Anhui province**	**Anhui province**	**Jiangxi province**	**Jiangxi province**	**Jiangsu province**	**Jiangsu province**	**All:**
Variables:	Tongling	Fanchang	Yugan	Duchang	Jurong	Jintan	*Total:*
Population:	344,804	445,323	788,814	638,632	599,975	540,600	*3,358,148*
Household sample:	250	251	209	250	250	251	*1461*
Number of interviews:	1035	967	818	1330	809	797	*5756*
GNP/capita: (RMB)	2897	2001	1278	1177	5272	6313	*3679*
IMR/1,000 live births	32.3	17.3	16.4	48.3	12.7	16.2	*22.5*
Senior middle or higher education:	6.1%	5.9%	9.6%	13.0%	7.7%	17.9%	*10.0%*
Out-of pocket paying population:	90.2%	89.1%	87.2%	87.8%	77.7%	9.8%	*76.0%*
Maternal prepayment coverage:	3.6%	0.7%	4.9%	1.7%	14.9%	43.3%	*9.8%*

Note; The IMR data are based on reports from the local Bureaus of Public Health. The quality and reliability of the data varies.

The questionnaire was developed through a consultative process involving both Karolinska Institutet and Shanghai Medical (Fudan) University. It was field tested in different counties in China. The questionnaire covered 192 variables. Information on education, occupation, family income, health insurance, distance to health facility, health status, disease history, out-patient health care expenditure in last two weeks and in-patient in last twelve months, were collected for all household members. Women aged 15 to 49 years were asked about their pregnancy and delivery histories, antenatal, delivery and postnatal service utilization.
Table 2 summarizes the design of the three studies.

Table 2, Research design

Study:	Expenditure Review	Household Survey	Provider Survey
Papers:	I, II	III,, IV, VI, VII	V
Perspective:	Macro	Micro	Micro
Type of study:	Natural experiment	Structured questionnaire, household interviews	Structured questionnaire, provider interviews
Sampling design:	Purposive selection of counties	Multistage sampling, purposive selection of counties (6), random selection of townships/towns (24+6), random selection of villages (120), random selection of households (1,500)	Multistage sampling, Purposive selection of counties (6), random selection of townships and towns (24+6), random selection of villages (120), systematic selection (random starting point) of staff, 50 from each county curative network, 50 from each county preventative network, 40 from each township and all staff at village health stations (1,064)
Type of data:	Retrospective panel data, interviews with officials, accounts data, official reports, Health expenditure and revenue data	Cross-sectional retrospective data, interviews with all household members, self-assessed health, income data, illness, utilization of health services, health care expenditure, delivery histories, indicator illnesses	Cross-sectional data, perceptions and attitudes of health providers, exploring the relation between health care financing and drug prescription attitudes and practices

The households were selected by four-stage sampling. The original intention was to select three provinces within reasonable travel distance from Shanghai, on the basis of having rural health insurance systems, representing different levels of GNP/capita ((Jiangsu, high, Anhui, medium and Jiangxi, low), and different levels of infant mortality rates (IMR); Jiangsu, low, Anhui, medium and Jiangxi, high.

The counties in Jiangsu had a higher income level, while the four counties in Anhui and Jiangxi had middle-low level incomes. The IMR figures reported for the six counties

differed very much, from 12.7/1000 in Jurong to 48.3/1000 in Duchang, and appear to be unreliable.

The three provinces are located in the Yangtse river basin in Central and East China, where approximately half of China's population resides.
Within each of the three provinces two counties were purposely selected, representing different health financing systems (insurance/out-of-pocket), but with similar socio-economic characteristics. In Jiangsu; Jintan (insurance) and Jurong (out-of-pocket), in Anhui; Tongling and Fanchang and in Jiangxi; Yugan and Duchang counties. The four counties in Anhui and Jiangxi all had out-of-pocket based financing of rural health care, with the exception of a few villages that upheld the CMS.

The selection of the provinces and counties was contingent on the willingness of provincial and local health authorities to cooperate. All the authorities that were approached agreed, however, to participate in the study.

All the townships were listed and divided into two groups according to income levels. In case there were insurance systems in the county, townships were divided into four groups. From the two or four groups of townships, four were selected randomly. One town in the county was selected randomly.
All the villages in the selected townships were listed and five from each township were selected randomly.
Finally all the households in the selected towns and villages were listed on the basis of the police registry and enumerated. Fifty households in the towns and ten in each village were selected randomly.

The interviewers, teachers or health workers from the local preventative health services, were trained for two days by the research assistants from Shanghai Medical University. General and specific interview skills were discussed to reduce the risk of bias. If a member of a household was absent, the interviewers returned up to three times. If the household member still was absent, the household was substituted by the first left-hand neighbor.

There were two quality controllers in each county, of which at least one was from Shanghai Medical University. They went back to two or three households in each township (5% of the sample) to re-interview, comparing item by item the response and checking each questionnaire for logic mistakes, confusing responses or incompleteness. If errors, the questionnaire was sent back for re-interviewing. In March 1996 a Chinese-speaking Swedish research assistant re-interviewed 25 households (10%) in one county for quality control.

An index was developed to measure the utilization of health care in relation to health status by income quintiles. The illness concentration index was calculated to provide a comprehensive measure of health status in relation to income level. The Kakwani index was calculated to measure inequity in the financing of health services in relation to income level. The Le Grand index was calculated to give a summary measure of inequity in the provision of health care. The data were analyzed by multiple regression

analysis and logistic regression analysis to identify socio-economic variables associated with ill health, utilization of health care, barriers to care and care-related debt.

6.3 PROVIDER SURVEY

A multi-stage sampling procedure was similarly used for the provider interviews (paper V). Multistage sampling was applied following the same steps as in the household survey, except for the final stage. Systematic sampling was used to select the providers (n=1064) at health facilities at county (tertiary hospital), township (secondary hospital) and village health station levels. Providers from both the curative and the preventative networks, as well as from the traditional medicine, were included. All the staff were listed and 100 staff working at county level, 50 from the curative network and 50 from the preventative, 40 staff from the township level and all staff at the village health stations in the selected villages in each of the six counties.

The interviews were completed in 1995. Providers at hospitals were interviewed by trained research assistants from Shanghai Medical University (SMU), while providers at the village health stations were interviewed by filling out written forms.

The questions covered the respondents' age, sex, educational level, occupation, work unit and department, experience, opinions and perceptions in relation to alternative health financing systems and determinants of prescribing. Specific questions were asked in relation to the indicator conditions/diseases.

Two research assistant from SMU were responsible for quality control and rechecking the questionnaires. If mistakes or missing replies were found the questionnaires were sent back for completion. Approximately 5% of the forms were subjected to the procedure, which led to a 100% response rate.

The data was analyzed by chi-square test for differences in proportions. 'Insured patients' in paper V, refer to patients covered by health insurance for formal sector employees, the health insurance system for government employees (Gongfei) or the health insurance for enterprise employees (Laobao) and their respective dependents. CMS participants were not included in the definition.

6.4 ETHICAL CLEARANCE

Medical research ethics are guided by *the Helsinki Declaration* from the World Medical Association Conference in Helsinki in 1964. The Helsinki declaration was mainly developed to respond to the ethical issues in clinical experimental research. The American Association of Psychologists has developed guidelines for ethics in human social scientific research.
The interviewees were informed of the purposes of the interviews and that their participation was voluntary. The data has been processed without names or other traceable information.
Ethical clearance of the research protocol was granted by the Research Ethical Committee of Karolinska Institutet in February 1996 (Ethical Clearance No. 96-061). In China the research protocol was accepted by the School of Public Health, Shanghai Medical University and the Public Health Bureaus of the six counties.

7 SUMMERY OF FINDINGS

7.1 HEALTH CARE EXPENDITURE REVIEW (PAPER I)

- In the nine year retrospective study period, 1986-1994, the deflated fee-for-service revenue increased more than GNP/capita in the 'insurance' county, while it increased in pace with GNP/capita in the 'out-of-pocket' county. The small difference in real fee-for-service revenue in 1986 had six-doubled in 1994. The fee-for-service revenue in the 'insurance' county was 87% higher than the 'out-of-pocket' county in 1994. The difference was statistically significant ($P<0.02$, double-sided Wilcoxon test).
- In the study period, the mix of health care services shifted to less preventative and more curative services and a higher proportion of tertiary curative services in both counties. The study period covered the nine years subsequent to the introduction of the health reform in 1985. The health reform implicated a reduction of the share of public budget funding of health care, an increasing share of fee-for-service revenue, management autonomy for hospitals and introduction of revenue-related bonus systems for doctors. In Jurong (out-of-pocket) 21.1% of the health care expenditure in 1985 was spent on preventative services, while in 1992 the share had dropped to 6.4%. In Jintan (insurance) 8.6% of the expenditure in 1986 was used for preventative services, dropping to only 4.0% in 1992.
- Real per capita expenditure on diagnostic tests increased by 86%, while expenditure on obstetric care decreased by 14% in the 'insurance' county in the study period, indicating that the increase in health care expenditure was not necessarily related to 'desirable' care consumption.
- Tertiary care consumption increased much more in the 'insurance' county than in the 'out-of-pocket' county in the study period. Tertiary care consumption was nearly three times (286%) higher in Jintan than in Jurong by 1994. The difference increased by 473% in real terms, statistically significant at $P<0.02$ (Double-sided Wilcoxon test)
- In 1992 the privatization of rural health care financing was almost total in the two counties. The share of funding from fee-for-service revenue had reached 90.3% in Jurong and 85.5% in Jintan.
- Health care utilization was much higher and increased at a much higher pace for the few participants in government health insurance (Gongfei) and enterprise health insurance (Laobao) than for the general population. Gongfei expenditure per capita in Jurong was five times higher than the mean per capita health care expenditure. The increase in total Gongfei expenditure was 97.1% in the four years from 1988 to 1992. Both in 1992 and in 1993 the Gongfei system faced huge deficits in Jurong. Scarce public resources were consumed by a small privileged minority. Less than two percent of the population consumed 12% of the total health care resources in the county.
- Drug consumption increased more in Jintan (insurance) than in Jurong (out-of-pocket). The per capita consumption of drugs was 67% higher in Jintan in 1994. In Jintan drug sales made up 38% of the health care revenue in 1994, while in Jurong 47% of the revenue came from drug sales.

7.2 HOUSEHOLD SURVEY (PAPERS IV, VI AND VII)

- A normal sex ratio for children under 18 years of age was found. In five of the six counties the number of girl children in the homes during the household survey exceeded the number of girls in pregnancy histories by 22%. The mean number of family members was larger than the mean number of family members in official registers for the five counties. The findings were statistically significant (P<0.02, Chi-square test). No significant difference was found for boys. The observation indicates systematic under-registration of girl children and indicates gender bias against rural girls. Registration at birth is a basic precondition for equitable access to health care and education. (Paper IV)
- In the post-health reform period, from 1985-89 to1990-95, the ratio of negative pregnancy outcomes (defined as miscarriage or still birth) to live births increased by more than 170% , while utilization of hospital delivery services decreased by 12% and qualified delivery supervision decreased by 17%. (Paper VII)
- The odds ratio for negative pregnancy outcomes (miscarriage or stillbirth) for out-of-pocket-paying mothers in relation to mothers covered by any form of health insurance was 1.54 in the period 1985-1989 increasing to 4.54 in the period 1990-1994. The difference was significant (P<0.01 Chi-square test). (Paper VII)
- Logistic regression analysis confirmed the association between utilization of essential delivery services and access to health insurance, bank deposit and low parity. More than 90% of CMS participants had qualified delivery supervision, while less than 50% of mothers paying out-of-pocket had access to a medical doctor or midwife for the delivery. The mean cost of a delivery (in 1994) was 30% of the mean annual per capita income. (Paper VII)
- Chi-square analysis of the utilization of antenatal services yielded significant results for eight socio-economic variables; 'maternal prepayment schemes' (p<0.0001), 'income' (P<0.001), 'insurance' (P<0.001), 'occupation' (P<0.001), 'education' (P<0.01), urban or rural 'residence' (P<0.01), distance to nearest 'township hospital' (P<0.05) and 'order of parity' (P<0.05). (Paper VII)
- Chi-square analysis of the utilization of essential delivery services yielded significant results for the same eight socio-economic variables. Hospital delivery was associated with 'maternal prepayment schemes' (p<0.0001), 'income' (P<0.0001), 'insurance' (P<0.0001), 'occupation' (P<0.0001), 'education' (P<0.0001), urban or rural 'residence' (P<0.0001), distance to nearest 'township hospital' (P<0.0001) and 'order of parity' (P<0.0001). Qualified delivery supervision was associated with 'maternal prepayment schemes' (p<0.0001), 'income' (P<0.0001), 'insurance' (P<0.0001), 'occupation' (P<0.0001), 'education' (P<0.0001), urban or rural 'residence' (P<0.001), distance to nearest 'township hospital' (P<0.0001) and 'order of parity' (P<0.0001). (Paper VII)
- The elderly, 60 years of age or more, had a more than five times increased risk of severe illness, defined as being ill for at least one consecutive month, (OR = 5.2, 95%CI = 3.2-8.3), while CMS participants had a three times lower risk (OR = 0.3, 95%CI = 0.1-0.8). Other health insurance systems were associated with a non-significant increased risk of severe illness (OR = 1.56, P=0.12). (Paper VI)
- Elderly (Beta = +0.205), farmers (Beta = +0.277), and participants in other health insurance systems (Beta = +0.243) all had a significant (P<0.05) positive association with the variable 'number of days in bed due to illness'. (Paper VI)

- CMS participants had a significantly lower risk of 'number of days with cough', (Beta = -0.151, P<0.05). Distance to nearest county hospital was also negatively associated, (Beta = -0.172, P<0.01), while occupation as farmer was positively associated, (Beta = +0.194, P<0.01). (Paper VI)
- The outcome variable 'number of days with fever' was significantly negatively associated with household income, (Beta = -0.178, P<0.01), and with education above primary level, (Beta = -0.112, P<0.05), while high age was positively associated, (Beta = +0.134, P<0.05). (Paper VI)
- The risk of 'number of days with diarrhea' decreased with household income, (Beta = -0.335, P<0.01) and distance to nearest county hospital, (Beta = -0.251, P<0.05).
- The risk of 'number of days with blood in the stools' was significantly associated with being a farmer by occupation, Beta = +0.480 (P<0.05). (Paper VI)
- A high level of inequity in health care utilization in relation to health status was identified by an index. The mean 'number of days with fever' in the last two weeks was 90% higher in the lowest income quintile compared to the highest income quintile. Yet, the mean outpatient expenditure at last visit was 60% higher for the highest income quintile compared to the lowest. The index of inequity in utilization showed that utilization in relation to health status was more than three times higher (1.71) for the highest income quintile than for the lowest (0.56). (Paper VI)
- The illness concentration index represents the difference between the cumulated proportion of individuals and the cumulated proportion of illness for the income ranked individuals. The illness concentration index for the six counties was negative both when using number of days with fever (-0.13) and days of cough (-0.12) as indicators. The index confirms that the poor suffer from a higher prevalence of morbidity. The level is comparable to the range of levels for the ten countries in the COMAC-HSR study. (Paper VI)
- The Le Grand index relates utilization by income strata to need. The calculation is similar to that of the illness concentration index. The population is ranked by order of income. The health expenditures and the illness are cumulated by order of income and the difference is calculated. The index was calculated for outpatient expenditures, using 'days with cough' (+0.32) and 'days with fever' (+0.31) as illness indicator and for inpatient expenditures using 'days with cough' (+0.21) and 'days with fever' (+0.20). The results confirm strong bias in health care utilization against the poor, favoring the rich. The bias against the poor is stronger than what was observed in any of the ten COMAC-HSR countries. (Paper VI)
- The Kakwani index measures the difference between the concentration curve for the share of financing (tax) and the plotted share of pre-tax income for the population cumulated by order of income. The index confirmed an extremely high degree of regressivity in the financing of health services, even beyond what could be expected in a fee-for-service system, (-0.73) for outpatient services and (-0.94) for inpatient services. This represents a strong deviation from proportionality in the financing favoring high-income earners. The highest level of regressivity in the ten countries in the COMAC-HSR study was found in the U.S. (1980) with (-0.39) for out-of-pocket expenditure. (Paper VI)
- The elderly (60 years or more) had a disproportionally low utilization of inpatient services, only 4.0% although they constituted 8.1% of the population and had a clearly worse health status. The multiple regression analysis of inpatient expenditure within last year, excluding seven extremely high observations, showed

that the key determining variables were 'high age' (Beta = -0.194, P<0.01), 'household income' (Beta = +0.243, P<0.02) and being a 'farmer' (Beta = +0.233, P<0.01). 'Female gender' had an insignificant negative association with inpatient expenditure (Beta = -0.142, P<0.10). With outliers included in the analysis no significant variables were identified. 'Higher education' (Beta = +0.132, P<0.10) and 'high age' (Beta = -0.115, P<0.10) showed insignificant association. (Paper VI)

- Multiple regression analysis of outpatient expenditure within last two weeks similarly could not identify any significant association when outliers were included. 'Household income' (Beta = +0.075, P<0.10) and 'other health insurance systems than CMS' (Beta = +0.073, P<0.10) showed weak association. Excluding six extreme observations, significant association was confirmed with three variables, 'other health insurance systems' (Beta = +0.174, P<0.0001), 'distance to nearest county hospital' (Beta = +0.094, P<0.05) and 'high age' (Beta = +0.088, P<0.05). (Paper VI)
- Difficulties to pay for health care at last case of illness was significantly associated with six variables. Three variables were associated with less financial troubles; 'CMS' (OR = 0.2, 95%CI 0.1-0.5), 'higher education' (OR = 0.6, 95%CI 0.5-0.9) and 'household income' (OR = 0.7, 95%CI 0.6-0.8). Three variables were associated with more financial troubles; 'prepayment schemes' (OR = 1.5, 95%CI 1.1-2.0), 'farmer' (OR = 1.8, 95%CI 1.3-2.5) and 'high age' (OR = 2.2, 95%CI 1.5-3.2). (Paper VI)
- One percent of the respondents reported that they resolved their financial difficulties by not seeking needed medical care. Logistic regression analysis identified three significant variables. 'Higher education' reduced the risk (OR = 0.3, 95%CI 0.2-0.7), while 'prepayment schemes' (OR = 2.0, 95%CI 1.2-3.5) and 'other health insurance' (OR = 3.2, 95%CI 1.4-7.3) increased the risk. (Paper VI)
- Debt resulting from medical fees was significantly associated with two variables. 'Higher education' reduced the risk (OR = 0.5, 95%CI 0.3-0.8), while 'farmer' occupation increased the risk care-induced debt (OR = 1.9, 95%CI 1.2-3.1). (Paper VI)
- The Cooperative Medical System (CMS) was associated with a five times less risk of facing financial difficulties, half the risk of care-induced debt (non-significant, 95%CI 0.2-1.1) and not one CMS participant reported having to forego care due to the cost of care. Furthermore, CMS was associated with better health, a three times less risk of illness with a duration of at least one month and less risk of suffering from cough. Other health insurance systems (Gongfei, Laobao and private health insurance) were associated with higher risk of illness, higher outpatient expenditure without evidence of reducing barriers to care. (Paper VI)

7.3 PROVIDER SURVEY (PAPER V)

- The provider survey confirmed moral hazard in the provider behavior, providing evidence of the etiology of the observed inequities. The results support the assumptions of causal direction in the observations in papers I and VI.
- The majority of clinical doctors confirmed that they alter prescriptions with consideration to the patients' financial status and the demand from the patients. Only 5% of clinical doctors said they would prescribe different iron tablets for patients suffering from anemia, while 67% of clinical doctors would prescribe different antibiotics depending on the patients' insurance status. 20% of clinical

doctors treating hypertensive patients and 21% of clinical doctors treating bronchitis patients would change the prescription in response to the patients' insurance coverage. Doctors at primary (74%) and secondary (75%) levels said they were more inclined to prescribe different antibiotics for insured patients than doctors at tertiary level (58%) (P<0.01).

- 80% of the doctors treating tuberculosis patients said that tuberculosis patients *never or only sometimes* complete the full treatment course. 60% of the clinical doctors treating tuberculosis patients said that they would alter the prescription depending on the insurance coverage of the patient. Doctors at tertiary hospitals (68%) were more inclined to alter the prescriptions than doctors at secondary (56%) or primary (42%) levels (P<0.01).
- 52% of the providers said that providers sometimes or often over-prescribe drugs. The most frequently given reason for over-prescription was demand from patients (63%) and the second most frequent motive was the influence of bonus systems (23%).
- The providers perceived that the health insurance coverage for the patients and their ability to pay for the care were the main determinants of the type of treatment. Insured patient are believed to receive more expensive drugs, more often be referred to hospitals or higher level of care and are anticipated to have better prospects to recover from illness.

8 DISCUSSION

8.1 PRECISION AND RELIABILITY

Precision refers to the occurrence of random error or non-systematic error. Random error in a study can be defined as the variation in the dependent variable, which cannot be explained. The precision will be low if the number of observations is too low.

There are two main ways to reduce random error in statistical analysis. The first is obviously to increase the sample size. Increasing the sample size will of course improve precision, but will also increase costs. Precision is therefore closely connected to issues of *study efficiency*. The efficiency of a study is determined by its design. In principle there are two dimensions that define the study efficiency. One is the relation of the information content to the number of study subjects and the other is the information content in relation to the costs of acquiring the information.[84]
Precision can be improved by changing the design of the study to achieve more reliable information from the same number of study subjects.
We used multi-stage sampling, including purposive sampling in the selection of the participating counties. The reasons were to ensure willingness to participate, to keep study costs down and to ensure that a sufficient number of CMS participants would be included. Multi-stage sampling can improve the study efficiency, but could also introduce bias.
In order to achieve precision in our household survey and provider survey and to improve study efficiency, *power* calculations were made to establish adequate sample sizes.

Low *reliability* can occur if inaccurate measurement instruments are used or by misreading the instruments. In bio-medical research, e g blood pressure or serum cholesterol levels could be misdiagnosed by deficient instruments or by misreading the instruments, which would compromise the reliability of the results.

The measurement instrument in our household survey and provider survey were the questionnaires. The questionnaires were developed in cooperation between Karolinska Institutet and School of Public Health, Shanghai Medical University and were field tested before finalization.

Objective standardization of a questionnaire refers to using exactly the same wording for all interviews with the purpose to achieve a higher degree of reliability. *Structured questions* refer to having a higher degree of semantic specificity, e g by asking 'for how many days within the last two weeks did you have cough?' in stead of asking 'how was your health in the last two weeks?' Structured questions aim to improve both reliability and validity.

The dominant part of our questionnaires were standardized and structured. The responses used for this thesis were all responses to standardized and structured questions.

Face to face interviews are generally considered more reliable than mailed questionnaires or telephone interviews. All the household interviews and more than 80% of the provider interviews were face to face interviews. Face to face interviews may, however, introduce an *interview bias*. The interviewer may unintentionally influence the interviewee by personal attitudes, perceptions and anticipations. This effect can to some extent be moderated by training of the research assistants prior to the interviews. Such training was undertaken prior to the surveys.

The reliability was tested by re-interviewing 5% of the samples.

8.1.1 Reliability of the Expenditure Data

Both inpatient and outpatient expenditures were used to measure utilization. Inpatient expenditure included all expenditures within the last twelve calendar months. The respondents were asked to specify how much they had paid in registration fee, surgery fee, diagnostics fee, drugs fee, bed fee, other fees and total fees. The respondents were asked to report the outpatient expenditure at last visit within the last two weeks. They were similarly asked to itemize the outpatient expenditure in the same categories, except bed fees. We used the sum total both for inpatient and outpatient expenditures in the analysis.
We also asked about cost of transport and waiting times. This information was, however, not used in the analysis.
The reliability of regression analysis is depending on the assumption of normal distribution. The distribution of inpatient and outpatient health care expenditures deviated strongly from normality with high skewness and high kurtosis, which could threaten the reliability of the results. The distribution of inpatient and outpatient expenditures are shown in Figures 3 and 4.

Figure 3, Inpatient expenditure within one year recall period
Y = Negative Exponential Smoothing

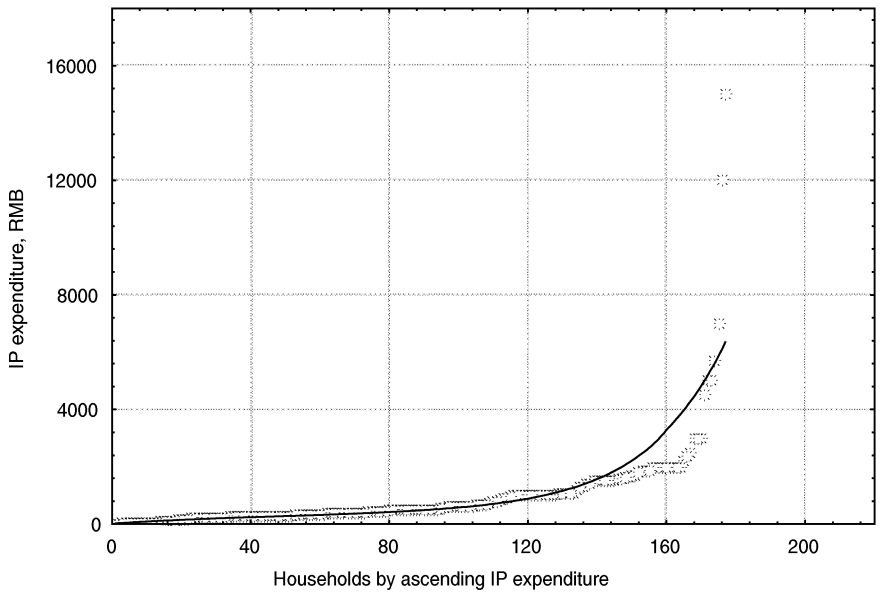
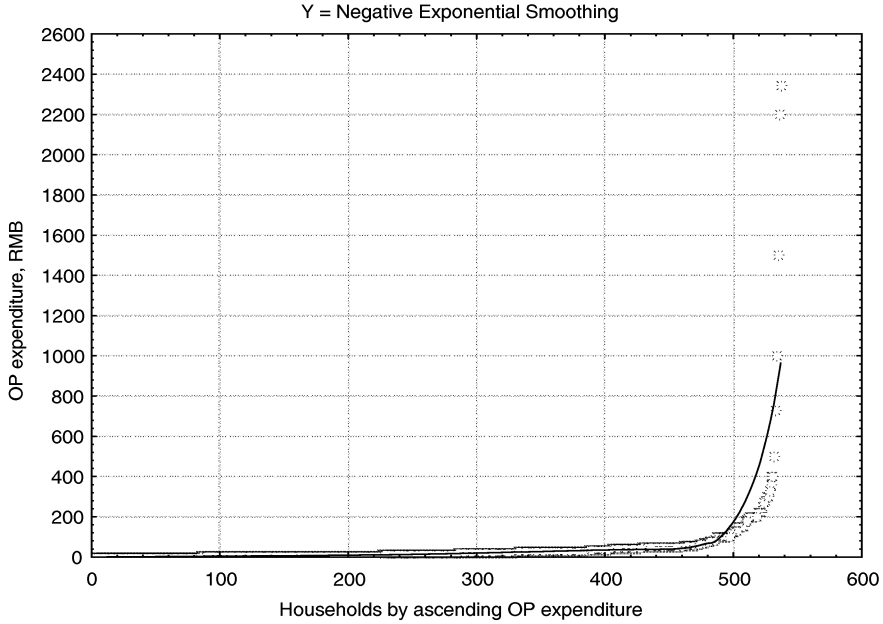


Figure 4, Outpatient expenditure within two-week recall period
Y = Negative Exponential Smoothing



The arbitrary and huge effect of the few high value observations of inpatient and outpatient expenditure, was therefore reduced by the exclusion of outliers. The properties of the distribution of inpatient care expenditure came closer to normal distribution, skewness dropping from 5.4 to 1.3 and kurtosis from 36.4 to 1.2. When outliers were excluded, expenditure of at least RMB 4000; seven of total 177 observations, the coefficient of multiple determination (R2) increased from 0.038 to 0.135.
With outliers excluded for outpatient expenditure of at least RMB 500; 6 of total 535 observations, the low coefficient of multiple determination (R2) increased from 0.012 to 0.046.

8.2 VALIDITY

Validity refers to systematic measurement errors. If reliability problems relate to inaccuracy in measurement, validity problems can be said to stem from measuring the wrong thing. By another definition, reliability is achieved when the same results are obtained from repeated measurements with the same instrument, while validity is achieved when the same results are obtained from measurements with different instruments.

Validity is often dichotomized into *internal* and *external* validity. Internal validity is achieved when the results are valid for the study population, while external validity is achieved when the results can be generalized outside the study population. External validity is conditional on internal validity. Internal validity depends on the control of various types of bias, which can be summarized as *confounding*. Confounding refers to the mixing of effects, where the influence of the studied variable is mixed with the effect of an unidentified variable. The confounding factor has to be associated both with the studied exposure and the outcome variable.

Surveys are subject to *interview bias*. Even with the most rigorous training of interviewers and reliability checking bias cannot be completely eliminated. This is particularly the case when the questionnaire involves sensitive questions.[85]
People's perceptions and responses can be affected by the interviewer, but even if there is no interview bias, people will still have different perceptions and impressions in relation to the same phenomena. This is what is referred to as the *Rashomon effect*, which will reduce reliability and indirectly compromise validity.[86]

The response rate was high both in the household survey and the provider survey, which should reduce the risk of *selectivity bias*.
In our household survey the interviewers were sometimes accompanied by local officials. This could have influenced the results in several ways. It is likely that the response rate would have been lower without the demonstration of support from local leaders. Some sensitive questions may have received a biased response when local leaders were present, e g income and fertility related questions. In paper IV a significant number of unregistered girls were found in five of the six counties. In the county where a difference was not found between population registers and actual numbers of girls, the local leaders, in discussions, still acknowledged the existence of unregistered girls.

Recall bias is known to affect all surveys where respondents are asked to recall past events. Recall bias will differ depending on the nature of the event and is also sensitive to age, gender and other individual characteristics of the respondent. For the expenditure review in paper VI, we used two weeks' recall for outpatient events and one year for inpatient events, which is commonly used for health care surveys.

In study VII we asked mothers to recall pregnancy related events and outcomes, going back several decades. This could clearly be problematic, but we believe that a pregnancy and especially stillbirths or miscarriages are so important events in the life of a woman that it is unlikely that she would forget even after several decades. Even if recall bias affected earlier pregnancies, it could not explain the large increase in the recent period from 1985-89 to1990-95.

The results of the same study could also be subject to *information bias*. Questions were asked about the outcome of pregnancies; induced abortion, miscarriage (spontaneous abortion), live birth or still birth. Miscarriage was probably differently understood by different women. The overall number of reported miscarriages was low, which indicates that most or all women only reported *late-term* miscarriages. If so, it would be a non-differential error, which would tend to reduce the observed effect.

The sampling procedure involved multi-stage sampling, purposive sampling, stratified sampling, systematic sampling and random sampling. Multi-stage sampling may introduce bias if there are confounding factors related to the selection criteria, which are not properly addressed in the analysis. One method of controlling confounding is to use multivariate analysis, which was applied in papers VI and VII. Confounding can of course still occur if not all confounding variables are identified and entered in the analysis. The study included qualitative data in the form of interviews with health officials and a series of focus groups with doctors and nurses. The qualitative data have not been published, mainly due to lack of time and resources, but the data were used to cross-check for possible confounders.

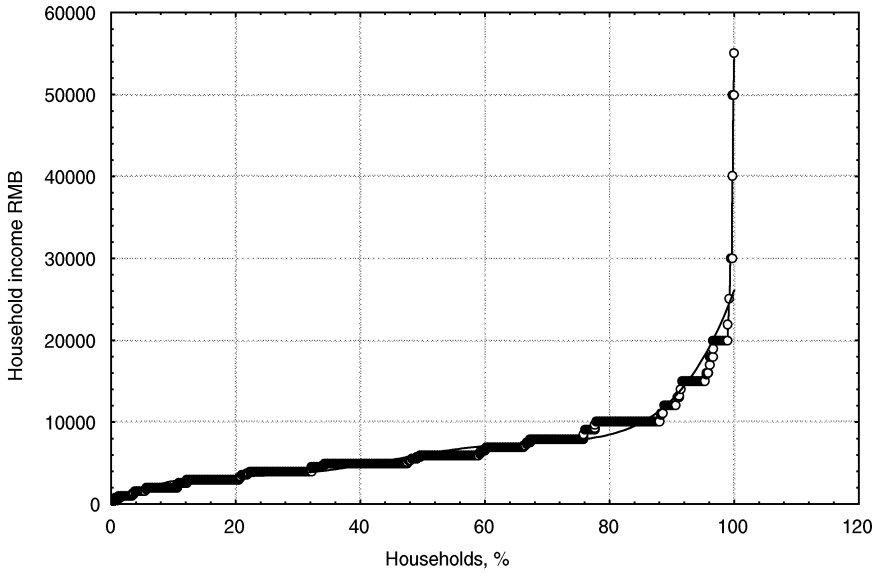
Income and health data from the household survey were tested to ensure validity.

8.2.1 Validity of the Income Data

The household survey income data was resulting from the question; 'What was your household's total income in RMB last year (1994)?' Self-reported incomes in poor rural settings are not always reliable, for a number of reasons. Most households depend on money income from farming, which is small, seasonal, irregular and difficult to assess. Some respondents may understate income for fear of taxes or simply to avoid envy. Others may strive to make a better impression by overstating income.
Pre-tax income was used since individual taxation is limited in China. In some studies household incomes are recalculated by an income equivalent scale to reflect the support load; number of family members and their ages. Raw household income data was used for the analysis. There are arguments both for and against using different weights and recalculations. The COMAC-HSR study also used raw pre-tax income data (USA and UK).

The distribution of household incomes was characterized by high skewness and high positive kurtosis. The strong deviation from normal distribution reduces the reliability of multiple regression analysis. Therefore, household incomes were re-coded into income deciles and quintiles, reducing the effect of outliers. The distribution of household incomes is represented in Figure 5.

Figure 5, Household income reported by heads of household, (n=1439)
Y = -686,7584+653,9161*x-40,5585*x^2+1,1649*x^3-0,0145*x^4+6,4879E-5*x^5
Scatterplot



In order to validate the raw income data, the household incomes were tested against last month's self-reported household expenditures and bank account balances. The household income was compared by Pearson r-correlation. The correlation coefficient was 0.39 (P<0.001) against last month's expenditure and 0.27 (P<0.001) against bank balances.

8.2.2 Validity of the Health Data

The health data (needs proxy); responses to a number of health questions in the household survey were tested against each other to ensure validity.

I used backward elimination discriminant analysis to test four independent variables against each other;
-number of days of illness within the last two weeks;
-number of days with cough within the last two weeks;
-number of days with fever within the last two weeks and
-number of days of hospitalization during last inpatient visit

Two alternative criterion variables were tested;
-age of 60 years or more and
-income quintiles.

For both criterion variables the number of days with fever was the last independent variable removed (Wilk's lambda, p<0,001).

8.2.3 Causality

The household survey and the provider survey produced cross-sectional and retrospective data. Cross-sectional data can present problems when the aim is to prove causal relation, because of the absence of an *induction period* which could link cause and effect at individual level.
Similarly, non-experimental, post-facto study designs offer several complications when attempting to demonstrate causal relations.

This study is mainly based on quantitative data, although both qualitative and quantitative methods were applied. The cross-sectional data was complemented by a natural controlled experiment, retrospective and panel data. Both macro- and micro-level effects were examined. This *triangulation of methodologies and data* serves the purpose of strengthening the validity of the observations and making assumptions of causality more plausible.

The research team represented different disciplines and orientations; health economics, public health, epidemiology, medicine and maternal and child health. The research environment at IHCAR provided access to and comments from experienced researchers in multiple disciplines.

The concept of causality is more of a philosophical than an empirical issue. In *econometrics*, causality is discussed in the meaning of '*predict*', while in natural science studies, causality is understood more in the sense of '*produce*'.
Econometric analysis is done under the hypothetical *assumption of instantaneous causation*. However, it is of course understood that instantaneous causation is a non-existing phenomenon. There must always be an induction period between cause and effect, but in empirical studies it is not possible to know a priori the correct induction period and also not possible to do continuous observations. Data can only be analyzed in relation to specific times, intervals and locations.

For operational purposes the *Granger definition of causality* can be used. Instantaneous causation exists if the present value of a dependent variable can be better predicted by using present and past values of one or more explanatory variables.[87]

8.3 EXTERNAL VALIDITY

External validity relates to whether or not the findings can be generalized outside the study population. Are the results from the six counties valid for the whole of the three provinces? Are the results valid for all of China? Are the results valid for other developing countries in Asia? For developing counties globally? Or are the results even valid globally for rich and poor countries?

These are difficult questions to respond to, not even possible to answer. Other studies made by other researchers in other settings will provide indications of the external validity of the findings. In the case of paper VII, we found surprising similarities in the results of a study in Turkey, where Celik and Hotchkiss reported from an analysis of the socio-economic determinants of maternal health care utilization. They found that educational attainment, parity level, health insurance coverage, ethnicity, household wealth and geographic region were significant factors affecting the use of essential maternal services. Hospital delivery and qualified supervision were significantly associated with parity of birth, wealth, income, health insurance coverage and residence (urban/rural).
The results from the Rand study also show similarities, which could imply a global validity of some of the observed effects of health insurance.

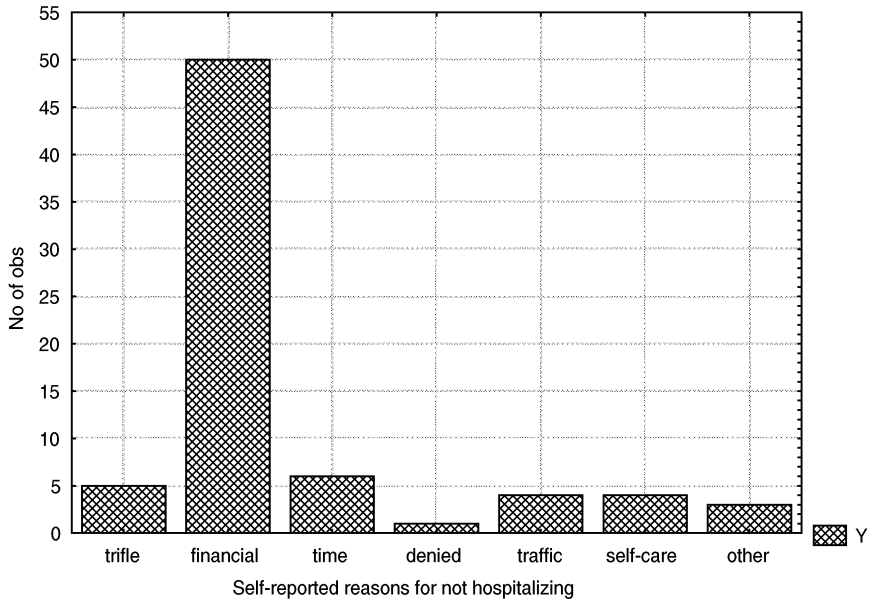
8.4 CONCLUSIONS AND POLICY IMPLICATIONS

The Chinese health sector was not exempted, when the economic policy in China shifted from Mao's egalitarian dogmatism to Deng's market dogmatism in the 1980s. Cost recovery, revised medical prices, reformed health financing, hospital management autonomy and bonus incentives for doctors and management were prominent features of the Chinese health reform from the mid-1980s. The dilapidation of the cooperative medical system (CMS) was an unintended side effect of the simultaneous introduction of the agricultural contract system. The resulting privatization of farming demolished the financial basis of the CMS and led to a disintegration of the CMS within a few years.

The results presented in this thesis support the conclusion that the level of inequity in health status, in utilization and in the financing of rural health services was very high in the six study counties. The observations related to maternal health care indicate that inequities increased subsequent to the launching of the Chinese health reform. The macro-level expenditure review showed that the expenditure trends were related to the health care financing system and that subsequent to the introduction of the health reform the care content shifted in the direction of a shrinking preventative share, more curative services and higher level curative services. Multivariate analysis demonstrated that the inequity to a high degree is associated with out-of-pocket payment of medical fees. Multivariate analysis showed that the CMS is associated with less risk of financial barriers to care, care-induced debt and ill health.

Figure 6 shows the reasons for not seeking further medical care for the 73 persons in the household survey, who had been referred by a doctor for specialist care. The overwhelming reason for not seeking clinically motivated care was financial problems.

Figure 6, Reasons for not seeking hospital care, although referred by doctor (N=73)



The original aim of this study was to assess equity with respect to economical, geographical, gender and age access to primary and secondary prevention and treatment, including access to pharmaceuticals. Indicators to be studied were obstetrical care at deliveries (primary prevention), family planning (primary prevention), iron deficiency anemia (primary and secondary prevention), tuberculosis (primary and secondary prevention), hypertension (primary and secondary prevention) and over/underuse of antibiotics.

This thesis presents the results of analysis of data related to economical, geographical, gender and age access to curative and preventative health services. Registration at birth (paper IV) and additional explanatory socio-economic variables; educational and occupational status were analyzed in an equity perspective. Access to pharmaceuticals (paper I and paper V), including utilization of antibiotics, was comprehensively addressed in my research partner Dong Hengjin's thesis.

The original aim was to examine inequity across different indicator diseases or conditions, based on the assumption that different diseases affect socio-economic categories differently.

Cochrane, commenting on the National Health Service (NHS), noted; '*Finally, one comes to the most important and interesting type of inequity: inequality between diseases. It is the least discussed of all the 'inequalities' but is , I think, a basic problem of the NHS. The best way of introducing the problem is the division of budgets amongst all the medical activities. I suppose some people believe that this is based on complex calculations, using cost/benefit ratios, expected incidence figures, and medical*

migration rates. I do not actually know how it is done, but I would guess that it would be nearer the truth to describe the process as 'same as last year plus or minus 5 per cent for pressure groups'.[88]

The potential to study inequity across the different indicator diseases/conditions has not been fully explored. This thesis presents analysis of equity in utilization of delivery care. Data related to the other four selected indicators were collected and preliminary analysis has been made on access to family planning services and tuberculosis care, although not yet reported in publications. Inequity from disease perspective remains under-investigated. It would certainly be a worthwhile area for future research.

We did not find evidence of geographic inequity in utilization, which is consistent with the findings of Henderson et al.[89]

Most published equity studies have examined socio-economic status (SES) as the independent variable, under the explicit or implicit assumption that SES is the key determinant of access. We found, however, that non-financial variables are also important determinants of equity. *Age* was associated with higher needs *and* lower utilization, independent of income and health insurance coverage.

Age carries with it a *gender* aspect since more women survive to high age than men. If the elderly suffer from more illness and yet have lower utilization, women will be more affected than men. Globally, the health problems of elderly women will be an increasingly important issue, given the demographic trends.[90] This is perhaps even more valid in China and many other developing countries in view of the smoking patterns.

The most important gender aspect in the results is, perhaps, the observation of *non-registration of a high number of girl children*, which is likely to have grave health and educational consequences. This is a highly contentious issue in China. The one-child policy has been an almost sacrosanct cornerstone of the demographic policy of the Chinese Communist Party, although never fully accepted by the people.

Could there be other explanations for the observed normal sex ratio? The widening economic gap between East and West China has created an army of migrant workers, predominantly male, who flee the poverty of their home villages to seek employment in the eastern cities. Theoretically, this could have affected the sex ratio in the observed direction. However, it would not be a credible explanation, since we also observed that the average number of family members was consistently higher than the official registers. Furthermore, the studied age group was 18 years and below, which would include few migrant workers.

There is widespread awareness in rural China that the family planning policies are not working. The results of the ineffective policies, the presence of a large contingent of unregistered girls, is impossible to hide. Although, sometimes, embarrassment over the situation could be sensed in the discussions with local officials, the de facto negligence of the official policy was never denied.

There are clearly well-informed and knowledgeable officials in China who want to see a policy change in the direction of voluntary, humane and awareness-based family planning policies. There have been cautious signals in China of a an emerging debate on the issue. One important consequence of the non-registration of girls is that, according to local officials, non-registered girls have to pay extra fees to avail themselves of education and health services. This will doubtlessly lead to an even lower level of school attendance and may jeopardize public health programs, e g the immunization program.

The education reform in China, like the health reform, involved decentralization of management and financial responsibilities and led to a proliferation and escalation of school fees. The result has been a high level of school truancy and a remarkable level of diversity in basic education in a country that once hailed uniformity. There exists no longer a common curricula for Chinese basic education.[91]

The decentralization and the resulting absence of cross-subsidization, combined with the high degree of geographic income inequality in China, results in glaring differences in service quality between the wealthy and the poor regions of China.

The results (paper I) demonstrated the macro level impact of the combination of health insurance and fee-for-service revenue. The fee-for-service revenue increased more than GNP/capita in the 'insurance' county, while it increased in pace with GNP/capita in the 'out-of-pocket' county. The mix of health care services shifted to less preventative and more curative services and a higher proportion of tertiary curative services in both counties, subsequent to the introduction of the health reform. The trend towards a higher share of curative and advanced curative services was more pronounced in the 'insurance' county.
The per capita health care expenditure for the few participants in the formal sector health insurance schemes (Gongfei and Laobao) was several times higher than the average health care consumption.

In the macro level health expenditure analysis (paper I) we did not separate between different types of health insurance. We assumed that the impact was no different for the different types of health insurance. The results from the household survey (paper VI) demonstrated that this was a false assumption.

The results (paper V) provide evidence of supplier induced demand. The clinical doctors confirmed that they are influenced by bonus and revenue considerations, that they adapt treatment according to the patient's financial situation and health insurance status. The doctors anticipated that the differential treatment would have an impact on outcomes. The providers perceived that the health insurance coverage for their patients and the ability to pay for the care were the main determinants of the type of treatment given. Insured patients were expected to receive more expensive drugs, more often be referred to hospitals or higher level of care and were believed to have better prospects to recover from illness.

An important result of this study is the observation of the *difference in impact between the different types of health insurance*. CMS was associated with a five times less risk

of facing financial difficulties, half the risk of care-induced debt and not one CMS participant facing financial barriers. CMS was also associated with better health, a three times less risk of illness with a duration of at least one month and less risk of suffering from cough. Other health insurance systems (Gongfei, Laobao and private health insurance) were associated with higher costs without evidence of reducing barriers to care. Surprisingly, non-CMS insurance systems were associated with an increased risk of illness.

The results (paper VII) indicate a negative impact of the health reform on vital maternal services. The findings support the assumption that the financial situation of the expecting mother has a strong influence on utilization of maternal health services. Logistic regression analysis confirmed the association between utilization of essential delivery services and access to health insurance, bank deposit and low parity. More than 90% of CMS participants had access to qualified delivery supervision, while less than 50% of mothers paying out-of-pocket had access to a medical doctor or midwife for the delivery. We also found indications of a negative health impact subsequent to the introduction of the health reform. In the post-health reform period, from 1985-89 to1990-95, the ratio of negative pregnancy outcomes (defined as miscarriage or still birth) increased by more than 170% , while utilization of hospital delivery services decreased by 12% and qualified delivery supervision decreased by 17%.

Traditionally, economists tend to discuss efficiency and equity in terms of a trade-off, where an improvement in equity may demand a reduction in efficiency, or vice versa, an improvement in efficiency may require a sacrifice in equity.[92] Some have even argued that economists should focus on efficiency aspects and leave equity concerns to the politicians.[93] However, since health needs are part and parcel of the inequity dimension, equity issues cannot really be separated from judgements of the effectiveness and ultimately the efficiency of health sector interventions.

Recently, some economists have been arguing that the existence of a *gradient in health* is by itself an argument for income redistribution and income growth policies, interventions outside the health sector, as the preferred strategy for better health. Such a strategy would diminish the political relevance of interventions targeting health care utilization and health care financing. Deaton e g suggested that the U.S. should aim for more general health policies by promoting education, which will serve the dual purpose of both having a direct impact on health and an indirect by the income-strengthening effects.[94]

The U.K. government commissioned an 'Independent Inquiry into Inequalities in Health', chaired by Sir Donald Acheson, which produced recommendations in the same vein. The inquiry noted that there are wide disparities in socio-economic status between social groups, with geographical, gender and ethnic aspects. The differences increased sharply in the last decade. The inquiry identified seven wider determinants of inequities in health, all outside the health sector; low income, education, employment, housing, transport, crime and trauma safety.[95]

The results from this thesis support the conclusion that *education*, independently of income, occupation and health insurance coverage, has a protective effect, both in relation to financial barriers to care, care-induced debt and ill health.
However, the results also demonstrate that the health care organization, financing and incentive systems play an important role in the shaping of inequities in health care utilization and in health outcomes.

It is a common approach to dichotomize health sector issues by assuming that the policy options are either *market-oriented reforms* or *stricter government control*. Fuchs has suggested that, given the decisive role of the physician in cost-determining clinical decisions, the role for *professional norms* is under-estimated as a tool for control. He noted that although hospitalizations have decreased and the number of physician visits has not increased, the medical care costs in the U.S. have increased considerably. The main cause of the cost increase is related to the *content of care services*. More expensive technologies are used for diagnosis and treatment without sufficient evidence of cost-effectiveness.[96]

The U.S. is one of the richest countries in the world. China's economy is growing rapidly, but China still has large areas where extreme poverty prevails. Cost increases are arguably a more serious problem in poor countries. Our results indicate that cost escalation, observed in the expenditure review (paper I), is associated with the financing system (paper I and paper VI) and the incentive systems (paper V). Similar to Fuchs' observations in the U.S., professional ethics influence cost-determining clinical decisions and impact on the content of health services in China. The results point to an unexplored potential in China for health policy makers to reform the incentive systems and to develop methods to influence clinical ethics and medical practice for better quality and cost-effectiveness.

In China the ownership of the health facilities is still dominantly public, but the financing has become privatized. In Sweden, consensus rules that health care financing must remain public, but partial privatization of service provision has been accepted, or encouraged, especially by Stockholm County Council. It is interesting to note the contrasting absence of a discussion of the effects of the privatization of health care financing in China, with the intensive debate in Sweden on the modest privatization of provision of health services. A conclusion from the Chinese experiences could be that public ownership in no way precludes commercialization of health care provision.

The results indicate that the disintegration of the CMS in the 1980s is likely to have had a highly negative effect on the welfare of the rural population in China.
The China Network for Training and Research in Health Economics and Financing was formed in the early 1990s, organized by the Department of Planning and Finance in the Ministry of Health, with financial support from the World Bank and Unicef. The Network established cooperation between nine medical faculties with technical support from Harvard School of Public Health. The Shanghai Medical University (SMU), School of Public Health, is the only medical faculty directly under the Ministry of Public Health and the leading research center in China in the area of public health. SMU was given the leading role in the research program of the Network. One of the

focus areas for the Network was the collapse of the CMS and its impact on equity in access to rural health care.
Our research project has had close contact and cooperation with the Network. The research protocol for this study was copied to all the nine participating medical faculties.

In October 1996 the Committee of Experts for the Study of Policy and Administration under the auspices of the Ministry of Health organized a three-day seminar on policies for the organization and financing of rural health care in China's poor areas. Three key problems were identified; the lack of financing for the rural population, the decreasing effectiveness of rural curative health care and a deteriorating preventative health care.

The seminar ended in four proposals;
1. Strengthened government responsibility and financial involvement to ensure provision of basic medical services to the rural population.
2. Reestablishment of the CMS, with funding from 'peasants', the 'society at large' and the government. The main thrust should be 'mutual help among peasants' to guarantee basic medical care and share medical expenses. Central, provincial, prefectural and county governments should allocate seed money (one RMB/capita).
3. Reform of public financial flows and allocation mechanisms for the rural health system. Facilities should be funded according to volume and quality in stead of number of staff.
4. The drug distribution system should be better controlled. Basic drugs should be supplied by the government at cost. Other prescription drugs should be listed and criteria set up for rational use. A low profit policy should be applied. Drug management and control should be strengthened. Advertising and rebates should be banned. Other general drugs could be marketed freely.[97]

The seminar led to a policy decision by the Chinese State Council and the Chinese Communist Party in the spring of 1997 with guidelines for the reestablishment of cooperative health care in rural areas in China. The Recommendation for the Development and Improvement of Rural Medical Care of 13 March 1997 was signed by the Ministry of Health, the State Planning Commission, the Ministry of Finance, the Ministry of Agriculture and the Ministry of Civil Affairs. The recommendation ended by stating that '*To realize the goal of 'primary health care for all' by the end of this century, governments at all levels throughout the country must give high priority to developing and improving rural cooperative health care and work hard to put into effect various forms of cooperative health care in most rural areas by the year 2000 and in the great majority of rural areas, the different forms of cooperative health care required.*'

Unfortunately, there has so far been little more than recommendations and guidelines coming from the central levels. The impact of the recommendations has accordingly been negligible. A growing number of providers have learned how to tap a lucrative market. It will take more than well-intended recommendations and guidelines to overcome the regressive financial incentives and profit interests that have developed in the vacuum of public financing in the last two decades. I believe that it will require both efforts to influence professional norms and ethics and a firm commitment to public

control over the financing of health services, with the objective of creating a health system with more quality and equity-oriented incentives, to reverse the negative trends. It will be necessary to convince the Ministry of Finance and political leaders of the importance of public funding and public control as an instrument of quality and equity assurance, both from human welfare point of view and from hard-nosed economic aspects. Public funds spent on health are seen as wasted money by some, but investments in economic development risk to be wasted if basic educational and health needs are neglected. I hope that this study, together with other studies, will provide arguments for the policy dialogue with the Ministry of Finance and political leaders.

8.5 SUGGESTIONS FOR FUTURE RESEARCH PRIORITIES

This study has generated several ideas for future research priorities. I will briefly summarize some suggestions.

- A large number of girls are not registered at birth as a result of the one-child policy. The consequences in terms of access to health care and educational services should be studied in a follow-up study design.
- We found indications of negative pregnancy outcomes subsequent to the health reform in China. We could not study maternal mortality since it was not part of the study design. A retrospective study of maternal deaths should be made to assess the influence of user fees and the impact of the health reform.
- There are indications of a resurgence of infectious diseases in China. The first World Bank supported Tuberculosis project was budgeted to USD 113.2 million. Yet, the tuberculosis prevalence in China has not been reduced, indicating low levels of case-detection. In paper III we suggested a need for studies of the determinants of individual tuberculosis treatment completion. The results presented in this thesis indicate several venues for further studies, e g the elderly as repositories for infection and re-infection and the financial incentives for clinicians *not* to refer TB patients to the free treatment system.
- The results in paper VI point to a combination of higher health care needs and lower utilization among the elderly. Qualitative studies should be undertaken to assess the reasons for the low utilization, its consequences and explore ways to address the problem.
- Pilot studies on comprehensive rural health insurance, building on the success of the CMS, should be undertaken in different counties with different economic status and evaluated to assess feasibility, affordability and sustainability.

9 ACKNOWLEDGEMENTS

When I started on this project nearly ten years ago I didn't really dare to expect that it would be finalized. The project has spanned almost ten years. My children have almost grown up with it. Only in the final few months I could feel reassured that it would be completed, when, for the first time, I could devote full, undivided time to the thesis.

It is thanks to the support, ideas and guidance from many colleagues and friends that it has come this far. Many have contributed and it's neither meaningful nor possible to put one contribution before another, yet three persons stand out as pillars for the project and I am happy to add also as friends, both before, during and after the project; my supervisor Professor Vinod Diwan, my Unicef colleague Dr. Zeng Donglu and my research partner Professor Dong Hengjin.

From 1983 to 1988 I was a staff member of Unicef with assignment to China. It was a time of great change in China, socially, economically and politically. The reforms started in the rural areas, where co-operative farming was abandoned and contract-based family farming took over. During that time the co-operative health insurance system (CMS) dramatically fell apart and was replaced with a financial void.

Dr. Zeng Donglu, was my colleague as Unicef National Health Officer and later cooperation partner as Director of the MCH Project Office of the Ministry of Health. Donglu gave invaluable support in the definition and organization of the project and she facilitated the contacts with Shanghai Medical University, the medical faculty directly under the Ministry of Health. She maintains her relations with Sweden as Skandia's Chief Representative in China

The ideas for this research project were influenced by Carl E. Taylor, Professor Emeritus and former Unicef Representative to China and Robert Parker, Associate Professor and former Unicef Health Officer in China. In every meeting with representatives from the Ministry of Health, Carl would call attention to the threats to preventative health care from the increasing user fee charges. I have to admit that I did not fully realize the importance of his observations at that time, although it sparked my interest in the issue.
Bob Parker, was borne in China and spent his first years in China. During his ten-year term with Unicef in China, his personality and extensive contact network gave him the position as one of the most trusted and knowledgeable foreigners involved in the Chinese health sector. I am grateful for his advice and comments at the initial stage of the development of the research protocol.

I learned from my Unicef experiences that the process of setting health priorities is, to a large extent, a complex, political and often muddled process. In a resource-constrained economy, it's all the more important, sometimes even a matter of survival, to make the process more rational. I resigned from Unicef with the intention to continue my studies to gain a better understanding of the theoretical and empirical aspects of health priority setting. From 1988 I started on the Public Health Master program at Karolinska Institutet.

In 1993 I attended the course in International Health Systems Research at IHCAR. This was where I came in contact with Professor Göran Sterky, Vinod and all colleagues at IHCAR. I was delighted that Göran Sterky agreed to be the initial supervisor of the project, until Vinod could take over. He shared generously his time and extensive knowledge. Vinod has supervised the project all along and been irreplaceable in all aspects of the planning and implementation. I could not have wished for a more knowledgeable, experienced and wise guide. Monica Johnson was a co-supervisor during the first years, until she left IHCAR, and gave much help and advice. Claes Rehnberg has been a much appreciated discussion partner several times. At IHCAR, support, advice and comments have been given by many. I am grateful to Stefan for taking the time to read my papers and giving helpful comments in the pre-disputation seminar. Eva and Bosse, I will never forget the good times we had sharing the basement room and luncheon soups! Thanks to Petra, who assisted in the data quality checking in China and to Annika, Carol and others who gave comments on the questionnaires. I will not forget when Anna-Berit showed the maternity ward at Danderyd Hospital to Wang Keli and Dong Hengjin. It was fascinating when they made the surprising discovery that acupuncture, no longer in use in China, was used as pain reliever in a modern Swedish hospital. Anna-Stina, Bodil, Kersti and Lars have provided much appreciated assistance through the years. Bengt, Cecilia, Chuc, Claes, Göran, Hans, Kyllike, Rolf, Staffan, Torkel, Tuan and all others, I wish to thank all for contributing to the atmosphere of IHCAR.

The original project supervisor at Shanghai Medical University was Professor Cai Wenwei, Head of Department of MCH. Unexpectedly, Professor Cai left China in 1994, which caused some uncertainty and delays. Her role was taken over by Professor Gong Youlong, Head of Department of Health Statistics. Professor Gong Youlong is one of the most experienced researchers of Chinese rural health care. He has consistently given support to the project. Professor Emeritus Gu Xingyuan, China's leading health care financing specialist, Professor Chen Jie, Deputy Dean of the School of Public Health and Professor Jiang Qingwu, Head of Department of Epidemiology, all gave support and continuous advice for the development of the project.
Results of the project have been published in Chinese in a special edition of the journal of the School of Public Health 'Chinese Primary Health Care' (Zhongguo Chuji Weisheng Baojian) in May 1997.

The research protocol was shared with the Department of Planning and Finance of the Ministry of Health and the Health Economics Network in China. It was copied and disseminated to medical universities in China, resulting in a number of invitations to collaborate.

One of the collaborating researchers, Zhao Genming, was invited to present a poster on 'the Impact of Socio-economics on Schistosomiasis Control' at the Annual Conference of Swedish Physicians (Läkarstämman), Älvsjö, in November 1995. He was also invited as a sponsored participant to present a paper at the International Epidemiology Conference in Nagasaki in November 1996. Research assistants from the School of Public Health of Shanghai Medical University participated in the data collection and analysis and made commendable contributions. Some of the research assistants have

used data from the surveys for papers and degrees. The household survey data resulted in a paper by one of the research assistants, Mao Limin, which was awarded the prize for best paper at the International MCH Conference in Wuhan in 1997. Mao Limin was subsequently selected for scholarship in Australia. In total, five of the Chinese research partners have been selected for international study grants, in the U.S., Australia and the Netherlands, which has been gratifying, but also caused some delays in the project.

I am grateful to Sida/SAREC for financing the research project and to Sida-East for granting me leave during these final months for the completion of the thesis.

Dong Hengjin successfully presented his thesis at Karolinska Institutet in January 2000. He included in his thesis a picture drawn by his son, which showed how anxious his son was that he would complete the work and put on his doctoral cap soon to be able to return to the family. I am sure that my two daughters, Anna and Lina, and Carina, my wife, at times have felt that this project has taken too much time away from them. I am grateful that they have allowed me the time and space and hope that they will find that it has been meaningful.

9.1 COVER ILLUSTRATIONS

The calligraphy (Yi Ming Jing Ren) on the cover was written by Professor Zhang Ding (b.1917), President of the Academy of Arts and Crafts in Beijing. Zhang Ding was admitted to the Beiping Art College, after leaving his home in Northeast, when he was in his teens. He held his first art exhibition at the age of fifteen in 1932. Zhang Ding was active in the Anti-Japanese War and joined the revolutionaries in Yan'an in 1941. Yet, he suffered much persecution during the Cultural Revolution. His son Zhang Langlang has described it in a book how; '*with paint on his face, a dunce cap and paper clothes, he was dragged through the streets to be criticized at struggle meetings. He was compelled to kneel on a high bench, and, even after falling off several times, he was forced to climb on it again. Later I was also pushed to the platform to receive struggle. Our house was searched time and again. Hundreds of father's paintings were completely destroyed…Father was later banished to a cowshed and forced to wear a black sign around his neck, clean latrines, and weed the garden. He had to perform a laborer's tasks in a sewage and heating system.*'
The cruelest punishment was when his son was arrested, falsely charged with espionage and counterrevolutionary activities and sentenced to death. Langlang survived, but spent ten years in prison until he was released. Langlang's crime was that he had conversed in French with foreign students, joking about Mao and his wife, Jiang Qing.

Zhang Ding is a highly respected painter and calligrapher. He maintains the traditional Chinese gentleman artist's distaste for commerce and has never sold his paintings.

The inscription 'When It Sounds, It Will Stir Humanity' (Yi Ming Jing Ren) is a quotation from a story in 'Shi Ji' (The Records of the Historian), written by Sima Qian, in year 145 B.C.

During the period of the Warring States (475-221 B.C.) King Weiwang of the state of Qi had been on the throne for three years, when a scholar by the name Chunyu Kun came to see the king. The king had so far not attended to the affairs of the state and the country was in decline.
The scholar wanted to put the king to a test so he said: 'Your subject has been puzzled by a riddle. May I ask your majesty to resolve it.'
The king asked him to go ahead. Chunyu said: 'It is told that a big bird is staying in the royal courtyard since three years, but no one has seen it fly or heard it sing. May your Majesty enlighten his subject by telling him why this is?'
The king understood that Chunyu was alluding to him, so he replied calmly with a smile: 'The bird has not used its wings because it has waited for them to grow strong. No one has heard its sound because it first wanted to find out the surroundings.
No one has seen it fly, but when it flies, it will command heaven. No one has heard its sound, but *when it sounds*, *it will stir humanity*.'

The painting on the back cover was made by the great 19th century eccentric painter Su Renshan (1814-1849). Su Renshan had a brief life and was a victim of prejudice, persecution and isolation. He was borne in the southern province Guangdong and came from a family of painters. He learned to read, write and paint at a very early age and was an accomplished and famous painter at the age of twelve. The first three decades of his life, he lived a quite normal and settled life. He was fond of reading the Buddhist scriptures and often went to the Goose Lake Monastery in Daliang to read and discuss with the monks. He often brought some cold rice and stayed in the mountains for days in deep meditation. The painting is from this period and the inscription says: 'Under the withered tree, I turn the pages of my book over and over, until the sun goes down and I fall asleep on the grass.'
When he was thirty, his life changed. He was sent to prison, charged with filial impiety. According to legend, he had participated in a conspiracy or at least made public comments offending the ruling Manchu dynasty. His family and home village were terrified and feared that they would be subjected to collective punishment, so they claimed that he was insane and arranged his imprisonment. He was living in a society in change, under the growing influence of the Western colonial powers. He had very strong feelings against the backward social conditions and traditions prevailing at the time and resented the occupation of China by the Manchus. He carved Chan (Zen) Buddhist sayings on his seals. The inscriptions on his paintings often reflect Buddhist teachings on the equality of all forms of life and the evils of killing.

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