Health Services in Rural China
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I. Introduction

The People's Republic of China (China) is one of the largest countries in the world. The territory of China is 9.6 Million Square Kilometers, which ranks the third largest country; and the population size has reached 1.308 billion by the end of 2005, which ranks the first in the world. Although China experienced a dramatic urbanization in the most recent year, over 57% of its population, which is 0.75 billion population, are still lives in the rural areas (Xinhua Publication 2006).

Administratively, China is divided into 23 provinces (including Taiwan), 5 autonomous regions, and 4 municipalities. All of these provinces, autonomous regions, and municipalities are composed of both urban and rural areas. The rural areas are administrated as counties, townships, and villages. There are 2,861 Counties, 38,028 Townships and 678,589 Villages in overall China. The average population size is 280,000, 21,000, and 1,200 in the county, township, and village respectively in 2004 (China Statistical Bureau 2005).

Rural health is one of priorities for Chinese government in terms of health system development in the country. Four basic principles for the organization of health services were expatiated at the China's first National Health Congress in August 1950 (Banister 1987).

1. Health services should be provided to the workers, peasants, and soldiers.
2. Preventive service should be the first priority among health services.
3. Chinese traditional medicine should be integrated with western medicine.
4. Health work should be combined with mass movements.

Based on these principles, the rural health system, including the rural health administration system and rural health service delivery system, has been established at the each administration level in the rural areas. The development of rural health system is significantly influenced by the macro-economic environments. The challenges faced in front of the rural health system are also differ based the macro-economic environments and the development process of health system itself. Here we divided the rural health system development in China into two major phases, the initial development phase and the health reform phase. In the initial development phase, China is recovering its economy from the decades of wars. The central planning economic system was developed in order to use the scarce resources to the most needed projects of economic development in the country. At that time, the collective economy was developed in the rural areas. The major challenge faced in front of the rural health system was how to rapid develop a health delivery system that are "available" to the most rural residents. In the health reform phase, China

transformed its economy from central planning system to the market-oriented system. The rural economy also transformed from collective economy to the individual responsibility system. The major challenge faced in front of the rural health system became the conflict between the "sustainability" of health delivery system and the "affordability" of health services to the rural residents.

This paper is organized into four sections. The introduction section provides the background information including a brief summary of China's geographic and administration status. Section II, provides an overview of China's rural health system and its initial development. The approaches that have been used to improve the "availability" of health services are described in this section. Section III describes the reform of rural health system brought on by economic reform. The conflict between "sustainability" of the rural health delivery system and the "affordability" of health services to the rural residents is described in this section. Then finally the alternatives and options for the further development of rural health system will be included in the last section, the section IV.

II. The initial development of rural health system: making health service available to the rural residents

Before the liberation in 1949, Chinese population health status was very poor and there was very little capacity to provide both curative and preventive health services to the population due to the decades of wars (Banister 1987). In order to improve population health status, the first challenge that Chinese Government faced is to rapidly establish its health system, increase the supply of health services, and make the basic health services available to the Chinese population. Availability of rural health services was the centerpiece of the rural health system development during this period.

1. The rural health administration system

In order to develop its health system, the health administration system was developed. This system is composed of a series of government health agencies at various levels of governments.

In China, the government structure from top to the bottom includes the Central Government, Provincial Government, Prefecture and City Government, District (in urban area)/County (in rural area) Government, and Resident Street (in urban area)/Township (in rural area) Government. Although the Neighborhood Committee (in urban area)/Village Committee (in rural area) also plays administration roles at the bottom below the resident street/township government, it is considered as the extension, not the formal entity within the government structure.

At the Central level, Ministry of Health (MOH) is the government agency that is responsible for the administration of health services for entire country. Within the MOH, the Rural Health Administration Department is the designated department that in charge of all rural health issues. The functions of this department include formulating the health policies that related to the health improvement of rural population, establishing the country strategic health plan to guide the development of rural health system, participating the regulation and legislation development that

regulate the rural health services delivery, implementing and evaluating primary health care (PHC) activities in the rural areas, monitoring and evaluating the progress of the implementation of the national health plan and the progress of the development of rural health system, coordinating the rural health services that initiated by other departments in the MOH, providing the guidance for the local governments on the rural health human resourced development, allocating resources from the central level to the local levels for special programs or for the transfer payment purpose, and etc.

The parallel departments/divisions of Rural Health Administration in the Bureau of Health (BOH) at the Provincial, Prefecture, and City levels are also established in response to tasks of the administration of rural health system at each level. The functions of these departments/divisions in the BOHs are to adapt the health policies that made by the Central Government to the local situation and implement these policies in the rural areas that located within the Provinces, Prefectures, and Cities. In addition to implement the health policies established in MOH, BOHs at Provincial, Prefecture, and City levels also have the responsibilities to make additional local health policies that are going to be implemented at their own regions and allocate their health resources to the local level for special health programs or for the transfer payment purposes.

The BOH in the County government is the only separated health administration agency that physically located in the rural area in the overall Health Administration system. Same as the Provincial and Prefecture and City governments, county BOH is responsible for adapting the health policies that made by the upper level Governments to the local situation and implement these policies in the rural areas that they administrated. In order allocate their health resources, they need to establish their own health plans based on their own situation under the guidance from upper level governments. They are also responsible for the monitoring and evaluation of the implementation of health policies, health plans, and the progress of rural health system development at their own counties.

2. The rural health delivery system

Three-tier health network, rural doctor, and cooperative medical system are considered the three pillars in the rural health system in China. The first two of these three pillars refer to the rural health delivery system, and the last one refers to rural health financing mechanism.

The three-tier health network is composed of village health post, township health center, and a series of county health institutes at the village, township, and county level respectively. This network is considered a cornerstone of rural health delivery system in China. The health institutes at the three levels are designed to work collaboratively. Within this network, there are referral and information systems from bottom to up levels; and there is training, monitoring/supervision, and technique assistant system from top to bottom level.

(1). Village health post and rural doctors

The frontier of this three-tier health network is the village health post. Village health posts were the collective-owned health institutes. The capital investments, including

housing, furniture, and equipments, of the village health posts were from or partially from the collective economy. Village health posts are the places that rural doctors conduct their medical work. In order to make basic health service available to the residents who live in rural area, the National Health Conference hold by the MOH in May 1950 proposed and start to train the health assistant who can work at the village level (Zhang, Wang et al. 1989). At the beginning of Culture Revelation, the former leader Mao Zedong mobilized the doctors from urban and county hospitals to visit the countryside and to train peasant health workers who were known as the "barefoot doctors". The term of "barefoot doctors" is used to emphasize the fact that these health workers did not become part of the professional health care system but instead remained peasants who performed their medical work at the village health post together with their agricultural tasks (Tao 1991).

The barefoot doctors were selected by members of the local people. The initial training of the barefoot doctors took place locally for a period, which ranged from three to six months, usually either in the township or county hospital. Subsequent continuing supervision and additional training periods were used to improve their knowledge and skills. The income of barefoot doctor was paid by the collective economy. The amount of their income generally determined in the same way as that of the other peasants in the commune, each peasant's earnings depending on the total income of the brigade and the number of "work points" that the individual collects. Doctors receive work points for health work just as they would for agricultural work. The work points assigned are generally at the high end of the scale equivalent to the points received by peasants performing heavy physical labor; on a scale of 1 to 10 points, the barefoot doctors are usually awarded 8 to 10 points for their work(Banister 1987). Therefore, they can provide the health services with minimum charges to the local residents.

Village health posts and village doctors are the "first contact point" for the rural population when they seek medical assistance. At the health village posts, village doctors perform a wide variety of tasks. They are responsible for the primary medical curative services for "minor and common illness" and first emergency medical aids. The also provided a series of public health services to the local residents.

Barefoot doctor's works was backup by the township hospital/health center, county hospital, and health prevention institutes. They can referral the patient to the township hospital/health centers or county hospital. They can get the technique supports for their public health service practices. Because barefoot doctors only obtain the minimum training and practice with very basic medicines and medical equipments, the cost of their practices were considerably low and the rural peasants and communities were able to afford these kinds services.

By the end of 1985, there were 777,674 village health posts across all rural China. There were 1,293,094 health workers, include both rural doctors and health assistants, worked in these village health posts. The average number of health workers was 1.8 per village and the number of health workers was 1.55 per 1000 rural residents (Table 1).

(2). Township Hospital/Health Center

The township health center was established at the end of 1950s with the establishment of People Commune in 1956. By the end of 1958, almost all People Communes built their own township health centers. These township health centers were further strengthened during the Cultural Revolution (1966-1976) (Liu, Xu et al. 1996).

The township health center is publicly owned health service institution at the township level. The capital investments, including housing, furniture, and equipments, of township health centers were mainly from the collective economy or from the local governments at township and county levels. The operational costs were also mainly covered by the collective economy or government.

The township health centers are administrated by both township government and County Health Bureaus and technically instructed by county health institutes. They provided both clinical services and preventive services to the local residents. Usually each township health center has 10 to 20 hospital beds. The employees who work in the township were considered as government employees or equivalent to the government employee. Their salaries are covered by the local government or by the collective economy. The doctors who work at township health center usually obtain three years of medical school education after high school. Township health center serves as a linchpin of the three-tier health care system in rural China. Only patients with the most serious diseases were referred to the third tier county hospitals.

Since the capital cost, the operational cost, and the salaries of employee were all mainly covered by the collective economy or by the local governments, the township health center were able to provide low cost services to the local residents. By the end of 1980, there were 55,413 township health centers across all rural China with 775,413 hospital beds and 1,037543 employees. The average number of hospital beds was 14 per township health center. Average number of employees was 19 per township health center, 7 of them were the doctors. The number of hospital beds at the township health center level is 0.95 per 1000 population (Table 2). These township health centers provided11.1 billion outpatient health services and 17.7 million hospitalization services in 1985. The rate of bed occupancy was 46.0% (Table 3).

(3). County hospital

The county hospitals are the highest health institute and the center for medical services in the rural area. County hospitals are all government owned institutes. They are all built and operated by the government. The employees who work in those institutes are government employee. The hospitals at county levels usually have around 100-300 beds and are staffed by physicians with four to five years of medical education after high school, as well as by nurses and technicians. They can provide specialty services as well as emergency services and receive referral patients from township and village levels. They are also responsible to provide training services and technical guidance to the township and village levels.

By the end of 1985, there were 2,276 county hospitals at the county level with 364,133 hospital beds. The average number of hospital beds at the county hospital level was 160 per hospital. There were 436,949 employees who worked in the county

hospitals the average number of employee was 193 per hospital, 53 of them were physicians. There were 1.53 county hospital per 1000 rural population (table 4). The occupancy rate of hospital bed was 80%.

(4). The preventive health services

The preventive health services are also provided by the three-tier health network in rural China. The preventive health services at county level were provided by a series of preventive health institutes that are independent from the curative institutes, the county hospitals. These preventive health institutes include the Epidemic Prevention Station (EPS), the Center for Health Inspection and Supervision (CHIS), the Institute for Maternal and Child Health, the TB control institutes, and other disease control institutes depend on the major health problems. Those preventive health institutes were replaced by and merged into the Center for Disease Control and Prevention (CDC) after 2002.

In order to rapidly controlling for the communicable diseases, Chinese Government established a separate epidemic prevention system, EPS system. The EPS was originally from Former Soviet Union (Chen 1985; Dai 1993). By January 1953, Chinese government authorized to establish EPS at each Provincial, Prefecture, City, and County levels. The tasks of EPSs/CDCs are directly related to the communicable disease control and prevention. Following preventive services are provided by the EPSs/CDCs to the general population. there are the infectious disease control and prevention, immunization, viral disease control and prevention, parasitic disease control and prevention, water, nutrition and food safety, environment hygiene and health related product safety, health surveillance and information service, health education, and emergence Responses.

While the EPSs are replaced by the CDCs, the national level CHIS was established as an executive organization of supervision and law enforcement by the Ministry of Health. In corresponding to the establishment of CHIS at central government level, the local CHISs, including county level CHIS, have been established at each level of the governments. These CHISs responsibility include the supervision and inspection in the areas of Food hygiene in food industry, Cosmetics sanitation in cosmetics industry; Drink water and water related industry, Sterile product industry; Health services sanitation; Occupational health at enterprises; Prevention and treatment of infectious diseases; Sanitation of public spaces, including hotel, restaurant, swimming pool, store, market place, etc.

The preventive health services in township level are provided by the township health center. Each township health center has a preventive health division with preventive health specialists who are responsible for the preventive health services for the local people, such as communicable disease monitoring and control services, maternal and child health services, and health education services. It is also responsible for the rural doctors' training and management tasks.

The preventive health services are provided by the rural doctors at the village level. In addition to the curative services, rural doctors also responsible for the preventive health services, which include the immunization, communicable disease monitoring and reporting, environment sanitation (providing the guidance and assistant to the

peasants to improve the sanitation of drinking water and human feces sanitation), and health education.

3. The rural health financing

(1). The rural health financing for the three-tier health network

The county hospitals and township health centers are government owned (some township health centers are collectively owned) health institutes. The employees who work in those institutes are considered the government employee. Government was responsible for their capital investment, the operational cost, and the most of employees' salary and welfare costs. These institutes, therefore, were able to provider clinical services at the price that below the true cost of the services. Preventive health institutes, including EPS and other specific disease prevention institutes, were considered the part of welfare entities and financed completely by the governments. These institutes provide free preventive health services to the residents and communities(Yu and Meng 1996).

The investments from collective economy to the three-tier health network are mainly at the village health post levels. As described above, the capital investments, including housing, furniture, and equipments, of village health post were from or partially from the collective economy. The salaries of the barefoot doctors who work in the village health post were also from or partially from the collective economy. These village health posts, therefore, were able to provider clinical services at the prices that below the true cost of the services and provide free public health services to the local residents. In addition to the investment to the three-tier health network, the major health investment from collective economy is to establish the CMS in rural China.

(2). Rural health financing for the Cooperative Medical System

Cooperative Medical System (CMS) is a community-based health insurance scheme that covers the medical expenses for rural patients. With the development of collective economy, this scheme was initiated in the rural areas in the 50s. This scheme was recognized by the MOH in 1960 and was introduced as model of rural financing mechanism. The successful experiences of establishing CMS in Changyang County, Hunan Provinces was introduced by the People's Daily Newspaper, the largest government newspaper in China, in December 2, 1968, which was considered the major event that boom the expansion of CMS in all Country.

CMS was designed and operated at the village or township level. This scheme was financially supported or partially supported by the collective economy at the village or township level. In addition to the financial contribution from collective economy, each individual also contribute certain amount premium to the scheme. The benefit package of services and the reimbursement rates were set by the local schemes. When patients utilize the services, they need to pay a flat service fee (registration fee) and co-payment fee. Since the services were subsided by the government and collective economy, the price of services were very low, the patients were able to afford those health services provided by the three-tier network in the rural area. By the end of 1976, 93% of rural populations were covered by the CMS system (Table 5).

In summary, with the 30 years efforts, China developed a well-established rural health system, which include the health administration system within the government system, three-tier health network, the rural doctor system, and the CMS. This rural health system provided enormous health services to the rural residents. The results of the 1985 National Rural Health Service Utilization Survey showed that 97.8% of rural patients obtained their health services within the three-tier health network; 76% of patient obtained their outpatients services at the village health posts and township health centers (Tao 1991). During this period Chinese population's health status improved dramatically. China rural health system made the significant contribution to these improvements.

III. The reform of rural health system: sustainability vs. affordability of rural health services

In 1978, China launched the most recent economic reform, to transform its central planning economic system to a market-oriented economic system and to modernize China in terms of its industry, agriculture, science and technology, and national defense system. Many aspects of this economic reform provided great opportunity for the further development of rural health system.

The economic reform was initiated by reforming the rural economy system. The collective economy was then replaced by the individual household responsibility system in the early 1980s. The financial incentive was that the farmers could receive direct economic rewards from individual productivity. The farmland was divided into small plots still under the ownership of the state. Each family makes a contract for its plot, agreeing to produce a certain quota of crops, which the state purchases at a relatively low fixed price. Then any output that exceeds the quota can be sold to the state or in the market at a higher bonus price (Hsiao 1984).

The economic incentives derived from the individual household responsibility system had greatly spurred agricultural production and efficiency. The annual net income per capita increased from 133.6 yuan in 1978 to 2622.2 yuan in 2003, a twenty-fold increase during the 25 years of economic reform. The Engle Coefficient (the percentage of food consumption in total consumption) in 2003 in rural China was 45.6%, which was 22 percentage points lower than in 1978 (Table 6). The rural economic development increased rural residents' capacity to consume more health services. It also increased the financial capacity of the governments on the investment of health system. In fact, the government investment in rural health increased from 3.8 billion yuan in 1991 to 10.1 billion yuan in 2000 (Table 7). The rapid economic development provided great opportunity further development of rural health system in China.

However, certain aspects of the economic reform also provided the challenges to the rural health system. There are two major challenges that are in front of rural health system. The first one is the sustainability of rural health system, and second one is the affordability of health system to the rural residents. In order to make the rural health system more sustainable as well as more affordable, China initiated its health system reform just one year after the economic reform (Peng, Cai et al. 1992).

1. The challenge of the sustainability of health system

(1). The increases of services' cost

After the economic reform, in order to mobilize the productivity, the bonus wage was introduced on top of the previous fixed standard wage, and was directly linked to an individual's productivity and institution performance (Coacy and Wang 2000). This reform measure was also introduced into the health system. The income of health workers who works in the county health institutes and township health centers also increased due to the introduction of bonus wage. Although this measure significantly mobilized the productivities of health institute and health workers, this bonus wage becomes the additional cost of the health institutes. In order to keep the financial balance, this cost increase has to be recovered either from the service charge, or by the subsidy from the governments. In addition to the labor costs increases in the rural health system, the cost of drugs, equipment, and supplies are all increased due to technologic development and overall labor cost increases in the market.

(2). The decline of government investment in relative term

After the economic reform, the government fiscal system was decentralized. As part of the general decentralization of the government authority, the structure of government health care financing was changed so that each level of government was directly responsible for maintaining the health institutions under its administration (Henderson, Akin et al. 1998). For example, the county government will be responsible for the investment on the county level health institutes and township government will be responsible for the investment on the township health center. In order to control the government expenditure, the local government fixed the share of the budget on the government investment to the health delivery system. Although the absolute value of government investments increased, the share of the government investment on total revenue of these health institutes declined due to the rapid increase in the overall cost of health services (Figure 1). About 90% of government budget is used to cover the salary health workers who work in the government owned health institutes. Only about 10% of government budget are able to support the operation of the institute and certain special health programs in 2000 (Figure 2). Sustainability of rural health system development becomes a very critical issue, especially in the poor rural areas.

Since the economic reform, the preventive health institutes were no longer considered the pure welfare entities. Governments provides a fixed budget to each preventive health institutes to cover staff salary and parts of services cost. Although certain preventive health services are still free for the public (paid by local government), such as the vaccines in EPI, random sampling sanitation monitoring in public sites, drinking water, and foods, a significant part of services were allowed to charge for services in order to generate additional revenue to compensate the government budget and to recover the full cost of these institutes(Liu 2002). The results of National Health Services Survey in 1998(Ministry of Health 1998), which included 130 EPSs data, shows that only about 38% EPS's revenue come from government budget in 1997. Fifty eight percent EPS's revenue comes from their service charge, which include physical check-up for the people who work in food industries, health monitoring and inspection, and other health services. With these additional charges,

the EPSs are able to recover their cost and have an average surplus for about 86,000 yuan per institute per year.

(3) The cost shifting and the cost increasing to the individual rural doctor

After the collective economy replaced by the individual responsibility system in the rural area, there is no more collective economy or very little collective economy to support the capital investment and the operation cost of the village health posts, the barefoot doctors has to find the ways to raise their own income and recover the cost of services from their medical practices. In addition, the barefoot doctors were gradually replaced by the rural doctors in order to improve their quality of services after the 80s. The rural doctors usually graduated from middle medical school to the equivalent level. They have to pass the qualification exam in order to get the rural doctor's certification. Therefore, their training costs increased. Rural doctor faced significant pressure to raise their services charges in order to cover these costs and match their income increase with the income increase of overall society.

Since many of these village health post and rural doctors, no longer obtain financial supports from collective economy or from CMS fund, they become private health clinics and private practitioners. It is estimated that there are about 1.2 million rural doctors and health assistants and 699,000 health posts (some health posts have more than one staff members). Forty one percent of these health posts are still owned by the collectives and the rest of them are owned by the individuals (Ministry of Health 2002).

(4) Cost recovery policies

In order to make the health system, including the rural health system more sustainable, a series of health reform measures are introduced in order to recover the cost of health services. One of the most controversial policies is allowing the health institutes to obtain 15-25% surplus from selling the prescribed drugs. Because the drug prescription and dispense are both in the health institute, selling the prescribed drugs becomes one of major revenue in the health institute. Furthermore, this policy becomes a great incentive to the health institutes to prescribe and sell more drugs and more expensive drugs to the patients since the can obtain more surpluses in absolutely value. This incentive is much stronger for the lower-level health institutes than the higher-level health institutes because lower-level health institutes do not have much other means, such as advanced diagnosis and treatment technology to obtain their income. The revenue from selling drugs reached to 52%, 65%, and 89% in the county hospital, township health center, and village health post respectively (Li 2001).

Another fee-for-service based cost recovery policy that has great impact to the rural doctor's practice is the services fee for injection. Rural doctors are able to practice both muscle injection and vein injection. The price for muscle injection is about 1-2 yuan and the price for vein injection is about 3-5 yuan. Although these prices are seems not very high, however, it is a net revenue to the rural doctor. In addition, lots of patients request for the injection instead of oral pills because they believe that the effects of injection is faster than oral pills. The muscle injection rate reached 66% and the vein injection rate reached 24% of prescriptions in some poor rural areas (Cheng 2000), which raised the question about the over utilization of injection services and

raised the concern about the safety issue of injections.

The third recovery health policy, which has a greater influence in higher-level health institutes than in lower-health institutes, is the price policy for new medical technology. Due to previous government subsidy to the health institutes, the costs of services are lower than the true cost. After the economic reform, government subsidy no longer subsidized the cost of newly developed medical technologies. Therefore, the prices for newly developed medical technologies are set based on the full cost recovery bases. Furthermore, because many of these newly developed medical technologies do not have reference price, the prices in fact could be higher than the true cost of the services. Therefore the health institutes have the financial incentive to supply more newly developed medical technology services, which usually are more expensive than the usual medical services.

In order to increase the investment on the health sector, the private investments are also encouraged. These private investments include the collective individuals' investment on overall health institute or certain large medical equipments in the health institutes. Although these investments are considered positively as the mechanism of increase the overall investment on health, it raised the concerns on regulation and management issues related to these investments. Since most of these private investments are profit driven, these investments may require the economic return at the market level. The utilizations of the services related to these private investment might be induced due the information asymmetry of information between health provider and health consumer. Therefore how to regulate these private investment and monitoring and control the utilization of these services related to these investment become very critical issues related the policy of encouraging the private investment in the health sectors.

In order to reduce cost of drug purchase of the health institutes, the drug distribution system was also reformed in order to increase the competitions among the drug suppliers. Hospitals and clinics are allowed to purchase drugs directly from drug companies, factories and retailers with lower prices (Dong, Bogg et al. 1999). This policy has enabled health institute to make more profits from selling drugs since the prices of the drugs are set by the government. If the purchase prices reduced, the differences between the purchase prices and selling prices at health institutes become larger and the profit from selling these drugs also increased, which create even more incentive for the health providers to prescribe and sell more drugs to those that able to make more profit for them.

2. The challenge of affordability of health services to the rural residents

(1) Health expenditure increases

Although the cost recovery policy increased the investment of health system, made the health institute financially more sustainable, the major side effect of these policies is the cost increase to the consumers. Overall, total health expenditures in rural China increased from 38.8 yuan in 1990 to 268.6 yuan in 2002, a sevenfold increase (Table 8). Most of these increases came from individuals' contributions (Table 2). The increase of individuals' contribution to the total health expenditure is much faster than the increase of their income in the same period (Table 6).

On the one hand, the rapid increase of health expenditure demonstrated the rapid development of rural health system. On the other hand, this rapid increase increased an extra financial burden to the rural residents, especially in the poor rural areas. Affordability be come one of social concern in the rural health system development. Cost inflation became another major barrier for the rural residents to access to health care services (Liu and Hsiao 1995).

(2). The collapse of CMS and the attempts of it reestablishment

In addition to the inflation of health expenditure, the collapse of CMS is another challenge faced in front of the rural health system in term of the affordability. with the replacement of individual responsible system to the collective economic system, CMS collapsed due to the loss of financial support and political interferences. By the time of 1990, only 6.1% of villages have kept the CMS system (Table 5) (Feng, Tang et al. 1995) and only 5% of rural residents were covered (Gu, Bloom et al. 1993). The rural health services are largely provided by individual rural doctors paid by fee-for-service payment method. Only those patients who have the ability-to-pay for these services are able to access these services (Hsiao 1995).

This out-of-pocket payment mechanism creates barriers for the rural residents to access basic health services and can lead to exclusion among poor individuals who cannot afford to pay the charges. The 2003 National Health Services Survey found that 45.8% of rural residents who reported to have illness in the two weeks prior to the survey did not visit doctors. Among them, 38.6% are due to inability to pay. The results also showed that 30% of rural patients didn't accept the doctors' recommendation of hospitalization; 75.4% of them are due to inability to pay (Ministry of Health 2005). According to various estimates, 30-50% of rural households living under the poverty line became impoverished because of illness (Gu 1991; Luo 1991). Poverty due to illness becomes one of major social concerns in rural China.

Although there were numerous attempts for restoring rural health insurance during 1990s, most of these attempts failed due the lack of policy support, lack of willingness and capacity to pay for the insurance premium by individual farmers, and lack of capacity of the management of CMS. In October 2002, China announced a new funding strategy for a newly established CMS. The government would entice farmers to participate in the new CMS by providing each participant with an annual subsidy of 10-20 Yuan RMB ($1.25-2.50 USD) in the poor rural areas. This newly reestablished CMS is a voluntary-based scheme and its benefit package design is left open to the decision of community level. In early of 2006, China government decided to expand these newly developed CMS. The aim of coverage rate of the new CMS is 40% in 2006, 60% in 2007, and 100% in 2008. In addition, Government decided that from 2006, the government subsidy to each participants will increase to 40 yuan in the poor rural areas ($5.0 USD) (Ministry of Health 2006). By the end of 2005, nearly 156 million rural population already enrolled in the new CMS However, because most of these newly developed scheme mainly cover catastrophic expenses (hospitalization services), only very small number of patients received the benefit from these new CMSs. In addition, because low premium and high cost of services, rural patients who

are admitted to the hospital still need to pay 73% of the hospital expenditure out-of-pocket (Hu 2005).

(3) The inequity in affordability of health services

In addition to the overall affordability of health service in rural area, inequity in affordability of health services also increased.

The major critiques of the Chinese economic reforms focus on the issue of inequality. Almost two decades into the implementation of the "get rich first" policy, the Gini coefficient, the indicator that measures income inequality, increased from 0.21 in 1978 to 0.42 in 2000 in rural China (Table 6). Per capita GDP in Shanghai is 37,382 Yuan, while it is only 2,895 Yuan in Guizhou in 2001. The income gap between the urban and rural was 2.9 times different at the beginning of the economic reform this declined to 2.3 during the initiation period of the reform during 1978 and 1985, while the economic reform was mainly focused on the rural economic reform. But this gap has increased since 1986 reaching 3.5 times difference by the late 1990s (China Statistical Bureau 2001). Income inequity makes inequity in affordability of health services. The 1998 China National Health Service Survey indicated that the two-week outpatient utilization rate is only 11.83% in poor rural areas (15% lower than the average level in rural areas).

3. Other challenges faced in from of rural health system

(1) The efficiency of rural health delivery system

In addition to the challenges of sustainability and affordability of rural health services, efficiency of rural health services is another major challenge. One of major objectives of economic reform is to increase the efficiency of overall economy. However, the efficiency of health services delivery in the county health hospitals and township health centers seems not be improved. Although the number of hospital beds per 1000 population declined (Table 2 and 4), the occupancy rates declined. The occupancy rate in township hospital declined from 50% in 80s to 36% in 2003. The occupancy rate in county hospital declined from 83% in 1990 to 60% in 2003. The overall number of outpatient services and number of inpatients services in Township health center also declined dramatically although the number of health workers increased, as well as the population increased.

(2) The quality of basic health services

Although the health services are available in the rural areas, the quality of services is still low. Training and economic incentives are two major factors that attribute to the low quality of services. Based on the statistics from MOH, there are still 38% of rural doctors who do not obtain three-year middle level medical training degree. This figure is even higher in the village health post in collectively owned village health post then in the privately owned village health post. In addition, the quality of services is also compromised by the inappropriate medical practice behaviors due to the inappropriate economic incentives. These inappropriate medical practice behaviors include the overuse of antibiotics and the overuse of injections. Due to the inappropriate economic incentive, the collaboration relationship among three tier health institutes

has been relaxed. The rural doctors become the potential competitors of township hospital/clinics and the township/clinics become the potential competitors of county hospitals. These inappropriate competitions also put the patient in the situation that may not be able to obtain most appropriate health services.

(3) Public health services

"Prevention first" is one of the principle of health system development in China. As previously mentioned, the positive effects of fixing government investment and introducing users' fee in preventive services increased financial accountabilities of the health institute institutes, which including the reduction of the waste through effective management, and increased the incentive to expand the preventive health services to the new areas such as testing the safety of the new construction materials, water purify devices, and so on and to the new population groups such as providing new immunizations (not included in EPI program) in certain high risk population groups. However, these policies also brought the negative effects with high social cost. Since the public health services have been divided into user's charge and non-user's charge categories, it creates incentives for EPS to over provide the services that can bring additional revenues to the institutes such as sanitation inspections (the food industries, restaurants, hotels, and industries which discharge pollutants and have risky working conditions, primary schools, etc. are subject to inspections by EPSs), and to under provide the services that could not bring additional revenues to the institutes such as immunization and monitoring of diseases(Liu 2002).

At the village health post level, one of severe problems brought by the structure change of economy is that there is no more economic incentive for the rural doctor, especially for the private rural doctor to provide public health service in their rural areas. Although some of them receive certain subsidies from government to conduct essential disease control and prevention program and government still request the rural doctors to play important roles on disease prevention and control, there is no incentive for them to play very active rule on the activities of environmental sanitation, vector control, and health education. How to ensure the public health services under new economic structure becomes a very critical issue in the rural area.

(4) The health disparity between rural and urban population

Although China has put great efforts to increase the health investment in the rural areas improve rural population health status, the mortality rates in rural areas is still much higher than in urban areas. The life expectancy in rural areas is about 69.6 years in 2000, which is 5.7 years lower than in urban areas(Zhong 2002). As Liu indicated (Liu, Hsiao et al. 1999), the gap of inequality in health status between urban and rural areas in China has widened over the course of economic transition. As an indicator of this gap, the Ratio of Infant Mortality Rate (IMR) between rural and urban areas has increased from 1.67 in 1981 to 1.75 in 1990 and to 2.93 in 1993. Although 70% population in rural areas, only 37.3% of health manpower are in rural area(Yin 2000). There are still lacks of health resources especially in the poor rural areas(Liu, Hsiao et al. 1999).

IV. The alternatives and options for the further development of rural health system

1. Enhancing the government roles in rural health development

Since the economic reform, market-economy approaches have been used as the resources allocation mechanism in order improve efficiency and productivity. However, the market mechanism has its limitation in the health system development. Market failures in the health sectors require government investment on health services, especially on the basic health services and public health services. Market failures in the health sectors also require government to play more active roles in terms of regulating and monitoring the performance of health system.

In order to strengthen the government roles in the health system development, the linkage between health and economic development need to be highlighted. The centerpiece of economic reform is the economic development. Although the health improvement of the population is also one of the objectives of social development, the concept of "investing in health for economic development" are still not widely recognized, especially in the no-health sectors. Emphasizing the contribution of investment in health to the economic development will put the health system development in a more advanced position in terms enhance the government roles in the rural health development.

2. Reestablishing the social value of equity

China has successfully transformed its economy from a central planning system to a market oriented economic system within last 25 years. With the economic transition, social values have also changed. "Getting rich first" becomes the most prominent social goal. Disparity in income, as well as the disparity in other aspects of society such as accessing health care and population health, becomes a normal and acceptable phenomenon (Wang 2004).

With the widening of social inequality, its negative effects on the social stability as well as health system development have emerged, which will in turn restrict the economic and social development. In order to correct these problems brought by on the market-oriented economic system, social value of "equity" should be reinstalled. A sustainable economic and social development has to rely on the balance of "great efficiency' and "reasonable equity" (Wang 2005). Social value development is the first step of making effective value-based policies to reach this goal (Whitehead, Dahlgren et al. 2001).

Market economy creates winners and losers. The winners in the market competition would obtain more resource to enjoy the goods and services that are provided by the market, and thereby enjoy the better life. The losers in this market competition, however, become the vulnerable population and are left out by the market economic system. With little resources, those vulnerable populations would not be able to enjoy the goods and service that provided by the market. Furthermore, vulnerable populations are exposed to much more risks than better-off populations, such as unhealthy housing, dangerous working conditions, nutritional deficiencies, more stressful, more smoking and drinking (Diderichsen, Evens et al. 2001). Therefore the

intervention from public sectors should be more leaning towards those vulnerable populations who in the poor rural areas and are left out by the market.

3. Re-integrating the services within three-tier network

Three-tier network is the cornerstone of the rural health system. It is an integrated system that is able to provide the continuum of health services, including both clinical services and public health services, to the local rural residents. However, the collaboration relationship among three tiers health institutes are undermined after the introduction of market competition. How to restore the collaboration relationship among different level health services are very critical for the further development of rural health system. In order to achieve this goal, the shared responsibility and accountability should be re-specified, the functions of these institutions in different levels re-defined. More specifically, the roles of village doctors should be focus more on the public health services and preventive services, rather than curative services. Their differential diagnosis capacity should be improved in order to appropriately referral patients who can't treat to the township and county levels health institutes.

4. Evidence-based health policy

Health system development is a very complex process. Many countries have experienced more than 100 years experiences of health system development and health system reform. However, there is no perfect health system yet in the world. Many of those countries are still put the great efforts in improving their health system, making the high quality health services available to their population, making health system more sustainable in the unpredictable economic environment, and making their basic health service more affordable to the population, especially to the poor.

Those worldwide continuous efforts provided the great references for Chinese health system development. However, China is so unique in terms of its economic structure and health system structure. Many of those challenges faced in front of rural health system are also unique. China really needs to strengthen its research capacity in the areas of health policy development. Most health system reform measures described in this paper were the rapid responses to the economic reform (Wang 2005). Lack of solid scientific evidences and lack of public debates makes those policies vulnerable in their implementations. The side effects of those problems may even severe than the problems that they intend to solve. There is a great need to conduct more researches to support sound evidence-based policies.

In summary, China has achieved significant progress in terms of rural health system development and delivery basic health services to the rural residents in the passed 50 years. The rapid development provided a great opportunity for the rural health development. With the current economic development, rural population has more capacity to invest on their health and has higher demand for better health services than they used to. The government also has more capacity to invest on the health system. However, the further development of rural health system still faces numerous critical challenges that have been discussed throughout the paper. Most of these challenges have been identified and recognized in China. However, the solutions of solving these problems are not quite easy. A series of strategies have been proposed to tackle these

problems in the current rural health system. The successes of these approaches not only depend on the technology feasibility, but also the political will.

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Table 1. The status of village health posts during 1985-2003 in rural China

Year	Number of village health posts	Percentage of villages with the village health post (%)	No. of total village health workers	No. of village doctors	No. of other village health workers	No. of village health workers per village	No. of village health workers per 1000 rural residents
1985	777674	87.4	1293094	643022	650072	1.80	1.55
1990	803956	86.2	1231510	776859	454651	1.64	1.38
1995	804352	88.9	1331017	955933	375084	1.81	1.48
1996	755565	89.1	1316095	954630	361465	1.79	1.46
1997	733624	89.3	1317786	972288	345498	1.80	1.45
1998	728788	89.5	1327633	990217	337416	1.81	1.46
1999	716677	89.9	1324937	1009665	315272	1.82	1.45
2000	709458	89.8	1319357	1019845	299512	1.81	1.44
2001	698966	89.7	1290595	1021542	269053	1.82	1.41
2003	514920	77.6	867778	791956	75822	1.31	0.98

Source: Chinese Health Statistical Yearbook 2004(Ministry of Health 2005)

Table 2. Number of township health centers during 1980-2003, China

Year	Number of township health centers	Number of hospital beds in township health centers	Number of health workers in township health center	Number of doctors in township health center	Number of hospital beds at township level per 1000 population
1980	55413	775413	1037543	390455	0.95
1985	47387	720619	905871	313517	0.86
1990	47749	722877	889219	358770	0.81
1995	51797	733064	1051752	424615	0.81
2000	49229	734808	1169826	514119	0.80
2002	44992	671295	1065276	415750	0.74
2003	44279	672741	1057463	412776	0.76

Source: Chinese Health Statistical Yearbook 2004(Ministry of Health 2005)

Table 3. The quantity of service provision at Township Health Centers during 1981-2003

Year	No. of visits (million)	No. of admissions (million)	Rate of bed occupancy (%)
1981	1438	21.23	53.5
1982	1419	22.28	54.2
1983	1365	23.73	56.6
1984	1265	18.93	49.1
1985	1100	17.71	46.0
1986	1118	17.82	46.0
1987	1130	19.59	47.4
1988	1136	20.31	47.3
1989	1160	19.35	44.6
1990	1065	19.58	43.4
1991	1082	20.16	43.5
1992	1034	19.60	42.9
1993	898	18.55	38.4
1994	973	19.13	40.5
1995	938	19.60	40.2
1996	944	19.16	37.0
1997	916	19.18	34.5
1998	847	17.51	33.3
1999	838	16.88	32.8
2000	824	17.08	33.2
2001	824	17.00	31.3
2002	710	16.25	34.7
2003	691	16.08	36.2

Source: Chinese Health Statistical Digest 2004(Ministry of Health 2005)

Table 4. Number of county hospitals during 1985-2000, China

Year	Number of county hospitals	Number of hospital bed in county hospitals	Number of health workers in county hospitals	Number of doctors in county hospitals	Number of hospital beds at county level per 1000 population
1985	2276	364133	436949	119503	1.53
1990	2240	388958	477849	137381	1.55
1995	2038	354900	468829	134051	1.59
2000	2037	350487	496321	150509	1.50

Source: Chinese Health Statistical Yearbook 2004 (Ministry of Health 2005), Chinese Health Statistical Digest 2000(Ministry of Health 2001)

Table 5. The coverage of Cooperative Medical System (CMS) in rural China during 1976-1990

Year	Villages	Village with CMS	% of villages with CMS
1976	677,834	629,708	92.9
1978	685,994	562,515	82.0
1980	702,908	483,601	68.8
1982	717,665	378,927	52.8
1984	715,265	54,100	7.6
1986	738,139	35,649	4.8
1988	734,095	41,940	5.7
1990	749,963	45,491	6.1

Source:(Feng, Tang et al. 1995)

Table 6. Per capita annual income and Engle coefficient in rural China

Year	Income per capita	Engle coefficient (%)	Gini coefficient
1978	133.6	67.7	0.21
1980	191.3	61.8	0.24
1985	397.6	57.8	0.26
1989	601.5	54.8	0.3
1990	686.3	58.8	0.31
1991	708.6	57.6	0.31
1992	784.0	57.6	0.31
1993	921.6	58.1	0.32
1994	1221.0	58.9	0.33
1995	1577.7	58.6	0.34
1996	1926.1	56.3	0.39
1997	2090.1	55.1	0.41
1998	2162.0	53.4	0.41
1999	2210.3	52.6	0.42
2000	2253.4	49.1	0.42
2001	2366.4	47.7	
2002	2475.6	46.2	
2003	2622.2	45.6	

Sources: (Zhao and Wang 2002; China Statistical Bureau 2005)

Table 7. Rural health expenditure and its sources of financing during 1991-2000 (billion yuan)

Year	Rural total health expenditure	% in total national health expenditure	Government expenditure	% in total rural health expenditure	Social expenditure	% in total rural health expenditure	Individual expenditure	% in total rural health expenditure
1991	29.97	33.73	3.76	12.54	2.02	6.73	24.19	80.73
1993	45.56	33.24	4.62	10.15	2.51	5.51	38.42	84.34
1995	80.44	35.63	6.68	8.30	4.38	5.45	69.38	86.25
1997	127.04	37.53	8.15	6.41	5.29	4.16	113.60	89.42
1999	147.48	35.29	9.42	6.39	5.20	3.53	132.85	90.08
2000	152.78	32.07	10.07	6.59	4.98	3.26	137.73	90.15

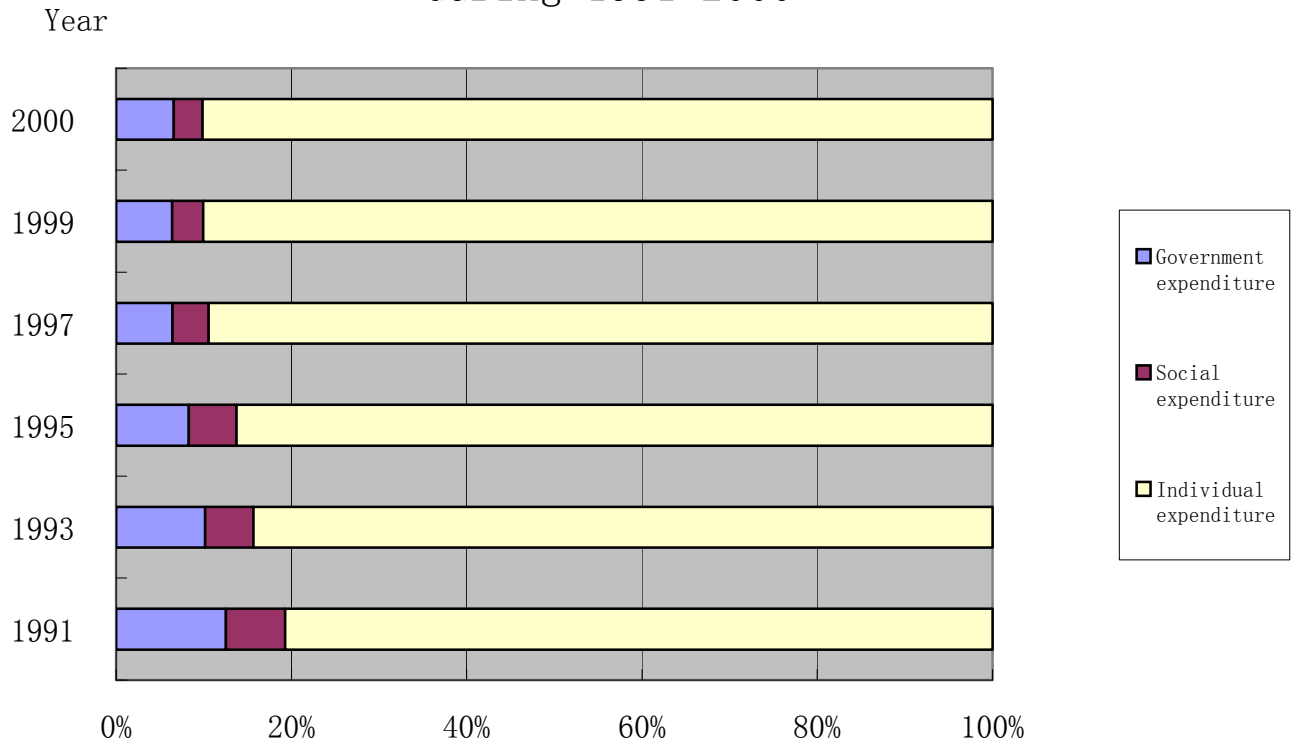
Source: (Li 2003)

Table 8. Per capita total health expenditure during 1978-2002 in China (yuan)

Year	Total	Urban	Rural
1990	65.4	158.8	38.8
1991	77.1	187.6	45.1
1992	93.6	222.0	54.7
1993	116.3	268.6	67.6
1994	146.9	332.6	86.3
1995	177.9	401.3	112.9
1996	221.4	467.4	150.7
1997	258.6	537.8	177.9
1998	294.9	643.0	188.9
1999	321.8	710.6	200.3
2000	361.9	828.6	209.4
2001	393.8	839.1	245.6
2002	442.6	932.9	268.6

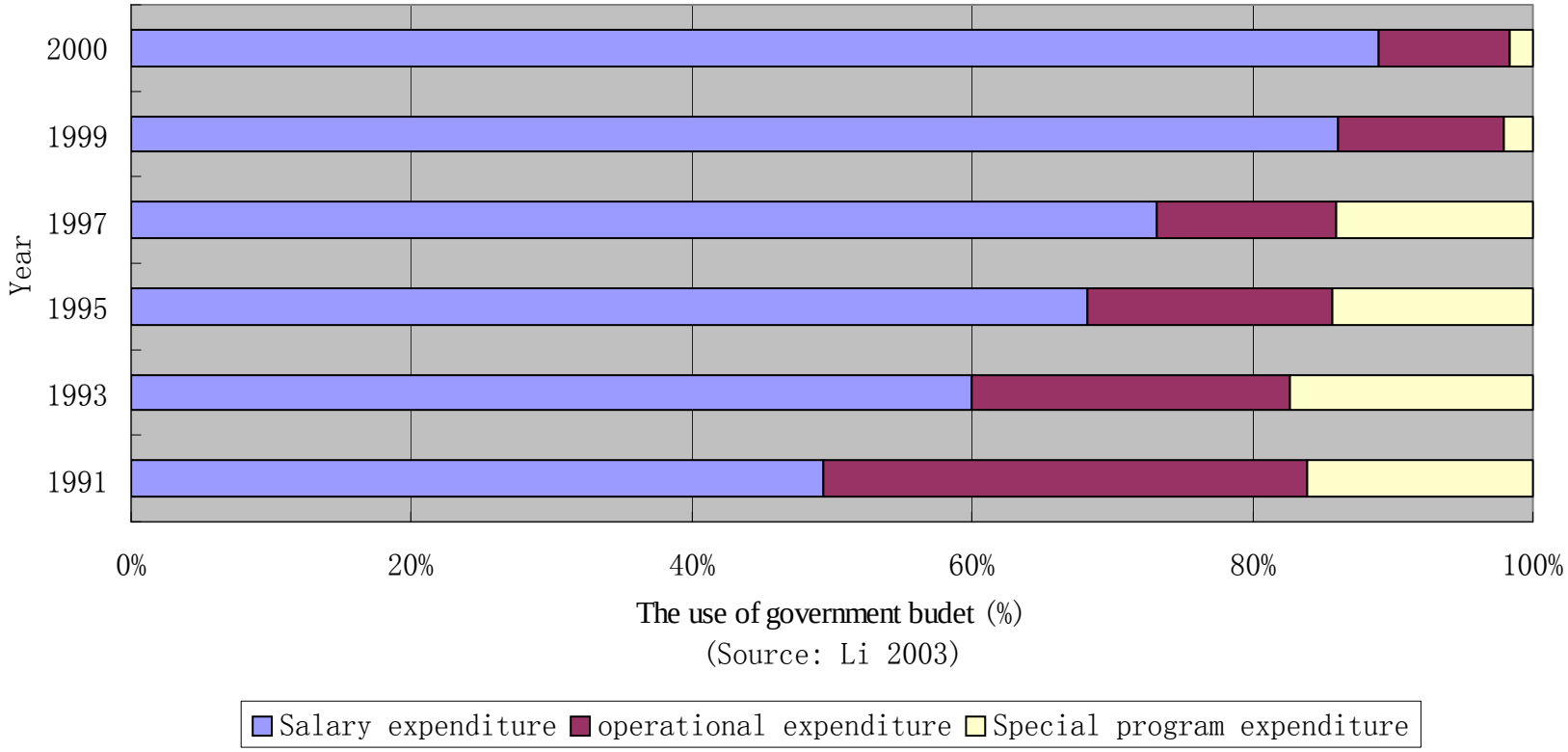
Source: Chinese Health Statistical Yearbook 2004
(Ministry of Health 2005)

Figure 1. Sources of health financing in rural China during 1991-2000



% of the total rural halth financing (Source:Li 2003)

Figure 2. The use of government budget in the rural health services



(Source: Li 2003)