Changes in Health Care Access in China, 1997 to 2006

Abstract

This research is an update of the paper ‘Changes in access to health care in China, 1989-1997’, published in 2005 by John S Akin, William H Dow, Peter M Lance and Chung-Ping A Loh’. Such an update is needed because in 1998, the State Council of the People's Republic of China established the basic medical insurance system for urban working people, which required the employees in urban and town enterprises to be covered by the system with the employers to pay for a proportion of the insurance. In 2003, the rural cooperative medical care program was also launched, under which rural residents and governments jointly contribute to a cooperative fund. As a result of this innovation in medical insurance, we expect changes in patterns of health care access compared with the earlier period.

The results for the period 1997 to 2006 show continued unevenness of access, but with a different pattern than in the pre-reform period. The poorer and more rural communities maintained high supplies of basic medicine and also faced relatively lower cost of health treatment over the whole period. The quality and quantity of staffs were both affected by income in later years, but in opposite directions, which leaves the combining fact to be a puzzle. Nevertheless, the trend appeared to be closely related to the coverage of the medical insurance system and also the changing economic circumstances during the survey period.

Acknowledgement

We thank the China Health and Nutrition Survey, funded by NIH (R01-HD30880, DK056350, and R01-HD38700), and the Carolina Population Center and the Chinese CDC for providing these data. We also thank David Maré from Motu Economics and Public Policy Research for providing the methodology theory and Stata code on adjusted deviation contrast coding system.

Introduction

Basic health services were available at fairly low cost in both urban and rural areas of China before the late 1970s. During the 80s and early 90s, urban employees were able to get health care support from the Government Insurance Program and the Labour Insurance Program, which was more of a social welfare than an insurance system. However, the rural population was ‘ineligible for any publicly financed insurance programs’ (Liu, et al. 2003). The majority of the rural residents paid out of their pocket for health care. Some used the cooperative medical plans managed by villages and townships, although these only covered a small amount of the rural population (Liu, et al.2003). Previous study by Akin et al. has studied the changes of access to health care in China between 1989 and 1997 across communities. They found evidence of relatively uneven changes between wealthier and poorer rural areas, and between access to clinics and hospitals. However, the situation may have changed after that due to the introduction of the new medical insurance system in 1998.

The medical insurance system reform started in 1994. The State Council launched experiments in 2 cities, Zhengjiang of Jiangsu province and Jiujiang of Jiangxi provinces. The experiments extended to over 40 cities from 1996 until 1998, when the big cities Guangzhou, Shanghai and Beijing also joined the reform. At the end of 1998, the State Council of the People's Republic of China issued the decision on establishing the basic medical insurance system for urban and town employees. This system is community based and covers all workers nationwide. It is a combination of social welfare and individual account, which required the enterprises in urban and town area to pay for a proportion of the insurance premium for all their employees. Self-employed people or rural workers can join the system if desired at their own cost. In 2000, the reform of the health and medical system and the medicine circulation system also started to resolve the systematic problems from the reform of medical insurance system by dividing hospitals into non-profit public hospitals as the majority and commercial hospitals as supplement. (Xinhua Net, 2005).

In this paper, we will look at the distribution of changes in access to health care for different types of communities using the 1997 and 2006 waves of the China Health and Nutrition Survey. We will examine the price for a particular routine service, time spent waiting to be

treated, staff quality and drug availability in health facilities in seven provinces. The aim is to address the effect from the reform of the medical system since 1998 on communities with different social and economics status.

Background

A previous study by John Akin, William Dow, Peter Lance and Chung-ping A Loh examines "the distribution of the changes in several indicators of access to health care across communities during the period 1989 to 1997." (Akin et al., 2005) The five indicators they used were distance to the closest health care service, price of routine services, staff quality, drug availability and waiting time to be seen by the health practitioner. Their data covered 155 communities of five classes, which are city, suburb, town, richer village and poorer village, in seven provinces, which are Jiangsu, Shandong, Henan, Hunan, Hubei, Guangxi and Guizhou, and clinics and hospitals were the two types of facilities been examined. The research shows that the five indicators changed unevenly across communities. Wealthier areas experienced less improvement in drug availability and waiting time than the poorer villages. Wealthier rural regions 'experienced the greatest improvements in the average quality of the care deliverer', whereas it was 'far less pronounced in the poorest rural areas'. (Akin et al., 2005, P87) The price of routine health services increased more in urban communities and wealthier provinces than in poorer provinces and rural communities. The distance to hospitals increased for all the sample communities, but was compensated by the decrease in distance to clinics, especially in poorer provinces. Overall, there was a loss of well-trained doctors in poorer communities, but improved access to clinics, which may offset negative consequences of the lower quality of staffing.

Uneven economic development continued in China after 1997. According to the Statistical Communiqué of the Peoples Republic of China on the 2006 National Economic and Social Development, the per capita disposable income of the urban population in China was 11759 Yuan in 2006, increased 10.4% after the adjustment of CPI, comparing with 2005. The per capita net income in rural areas, on the other hand, only had a real increase of 7.4%, to 3587 Yuan. (National Bureau of Statistics of China, February 2007) The ratio between the urban and rural per capita income was 3.28, increased from 2.47 in 1997. Comparing Jiangsu and Guizhou, the provinces with the highest and lowest per capita income in our sample, the difference of income levels between them also enlarged obviously. The ratio between the urban per capita disposable incomes in the two provinces was 1.29 in 1997 and 1.54 in 2006, and 2.52 and 2.92 for per capita net income in rural area, according to the numbers from

Statistics Communiqués of Jiangsu (Guizhou) on the 1997 (2006) National Economic and Social Development. This paper will show whether the uneven development in rural and urban areas also affects for the access to health care facilities. We will examine the same four indicators of the access to health care services, price of routine services, waiting time to be seen by health practitioner, staff quality and drug availability, in China between 1997 and 2006 [1] for the same seven provinces.

[1] The distance to closest health facility is not examined in this paper due to the lack of access to the community data.

Analysis

Data

The data used for this paper is the 1997 and 2006 panel of China Health and Nutrition Survey (CHNS), provided by Carolina Population Centre and the Chinese Centre for Disease Control and Prevention. The CHNS survey is an ongoing international collaborative project between the Carolina Population Centre at the University of North Carolina at Chapel Hill and the National Institute of Nutrition and Food Safety at the Chinese Centre for Disease Control and Prevention, which was designed to examine the effects of the health, nutrition, and family planning policies and programs implemented by national and local governments. The 2006 panel is the most recent data for public use and the 1997 panel was the latest panel used from the previous study.

The CHNS team drew the sample using a multistage, random cluster process in nine provinces. Counties were stratified by income (low, middle, and high) and a weighted sampling scheme was used to randomly select 4 counties in each province. In addition, the provincial capital and a lower income city were selected when feasible, except that other large cities rather than provincial capitals had to be selected in 2 provinces. Villages and townships within the counties and urban and suburban neighbourhoods within the cities were selected randomly. In 1989-1993 there were 190 primary sampling units: 32 urban neighbourhoods, 30 suburban neighbourhoods, 32 towns (county capital city), and 96 rural villages. Since 2000, the primary sampling units have increased to 216: 36 urban neighbourhoods, 36 suburban neighbourhoods, 36 towns and 108 villages.[2]

In this paper, we only keep a balanced panel as our sample.[3] 166 communities were surveyed in both 1997 and 2006. To be able to compare results across years and within same type of facilities, we drop communities with no health access information reported in either year, or communities with only one type of health facility in either year. This leaves us a sample of

2 http://www.cpc.unc.edu/projects/china/design/survey.html, retrieved 13 Jan. 09

3 By balanced panel, we refer to communities not households. Households surveyed in both years did not necessarily provide answers for health services usage and household could be split in later years. In out sample, any households in the communities that were surveyed in either year and used health services are included.

137 communities, and each of them contains 15 to 60 households, and 40 to 120 people. We then group communities into five categories, city, suburban area, town, and richer and poorer rural villages. Between the two survey years, all the communities retain their urban/rural status, and we categorize communities as poor or rich using the same approach as Akin et al. 2005 which splits the sample by whether the average income for the community falls short of or exceeds, respectively, the overall average income for the sample using 1997 per capita real income data.[4] The final sample includes 16 cities, 24 suburban areas, 22 towns, and 75 rural villages, with rural villages further split into 25 richer and 50 poorer communities. Theses communities were evenly distributed in 7 provinces – Jiangsu, Shandong, Henan, Hubei, Hunan, Guangxi and Guizhou, with slightly less sample points from Jiangsu, Shandong and Hunan provinces.

Table 1 provides the summary statistics of the geographic distribution of the communities. Part A shows the even distribution of the communities across province and community class, respectively. Part B of the table shows the tabulation of province by class for all communities. The distribution in part B is not even due to the lack of data for either type of health facility. For example, Shandong province has no cities in the sample because the only 4 cities surveyed in both 1997 and 2006 didn't have clinic information collected from any households in 1997. Overall, the sample includes more rural communities than urban communities, and the number of poorer villages is twice that of other classes. The economic characters changed a lot from 1997 to 2006. From part C of Table 1, we can see that villages moving from the bottom 25% to the top 25% with respect to the per capita income level, and also vise versa. This illustrates the fact that, "some communities have benefited tremendously from the opportunities created by the ongoing reforms, while others have suffered from other concurring changes" (Akin et al., 2005, p. 82)

Table 2 shows the distribution of per capita income in 1997 and 2006, as well as the changes between the two years. Per capita income in richer villages is the highest in 1997, followed by the suburbs, cities, and then towns. Residents in poorer villages have the per capita income a lot lower than other classes. In 2006, per capita income increased a lot overall, with the greatest increases occurred in cities, more than doubled, followed by suburbs (77%), whereas

4 The per-capita income is calculated by CHNS, details see 'household income variable construction' from the CHNS website. In particular, these are real income adjusted using the various inflation rates among different provinces during the 9-year period.

the increase in rural communities are lower than 50% in towns and villages, but is about 76% in poorer villages due to the uneven improvement in villages showed in part C of Table 1. Clearly, the urban communities benefited a lot more from the economic development than the rural communities in those years, with per capita income in both urban classes to be significantly higher than in the three rural classes. Among provinces, Jiangsu is the one with the highest per capita income for both years, 5213 Yuan in 1997 and 8465 Yuan in 2006. Guangxi province was the one with the lowest per capita income in 2006, dropped from the fourth in 1997, which was a result from the smallest income increase between the two survey years, 29%. Most provinces experienced about 80 to 100 percent increase (Shandong, Hubei, Henan and Guizhou), followed by 42% increase in Hunan and 62% increase in Jiangsu. The difference of per capita income between the richest province and the poorest province increased from 2653 Yuan to 4230 Yuan during the period. The two provinces with the lowest income in 2006 were also the two with largest ratio between urban and rural income.[5]

In summary, from 1997 to 2006, urban residents benefited more from the rapid income growth in China than the rural residents and the distribution of per capita income in our sample provinces also changed a lot during the period[6]. We also provide the per capita income by class and province in the two survey years in part C of Table 2.

Access Measures

The measures of access used in this paper include charges for routine services, time spent waiting to be seen by a health professional, the availability of western type medicine practitioners and the availability of basic medicine in the facility. Given the major differences between hospitals and clinics, we examine all the facts separately for each of them. For 1997 data, we use the same grouping rules as the previous study, which includes city, district, township, county, street/community hospital, work unit, army, university affiliated, provincial, specialty hospital and private hospitals into the category 'Hospital', and village, neighbourhood, work unit, woman and child health, and private clinics in the category 'Clinic'. In 2006, the categories of health facilities have been changed slightly. We then

[5] The ratio between urban disposable income and rural per capita net income was 3.57 in Guangxi and 4.59 in Guizhou, calculated from the data from statistics communiqués of Guangxi (Guizhou) on the 2006 national economic and social development.

[6] Please note that our data sample is not representative for China. Therefore, the per capita income table in the appendix is purely the income distribution derived from the sample households.

group village, private, work unit, and other clinics into 'Clinic', and town, county maternal and child, county hospital, city maternal and child, city hospital, worker's hospital and other hospitals into 'Hospital'. The obvious change here is that the maternal and child hospital replaced woman-child health clinics and hence ended up into a different stratum. Like the previous study, we do not include pharmacy/drug stores in our analysis. This is due to the small sample size, especially when we tried to form the balanced sample.[7]

The measures of service charges, waiting time, availability of western type doctor and availability of drugs used in this analysis are community averages, with the former two being medians and the latter two being means. The means and medians are derived from the facility characteristics reported by the sampled households within each community in the two survey years. The service charges are measured for the cost of treating flu for a self-pay person, inflated to 2006 Yuan, where the missing prices are imputed by the province median for the same urban/rural category. We then calculate the ratio of that median price to the average per capita income within the same community (in thousand), and use it to represent the 'relative price' of a routine health service. Similarly, the missing waiting time and availability of western doctors and drugs are imputed by the province median of the corresponding measures for the same stratum of facility, same urban/rural category and same survey year.

Table 3 provides the summary statistics for these access measures and the overall changes in each of them between 1997 and 2006, with a more detailed comparison of the changes in all access measures across community strata in Figure 1. The prices are measured at 2006 Yuan, waiting time in minutes and the availability measures in percentages.

From 1997 to 2006, the cost of treating flu increased remarkably, with a 101% increase in clinics (12.7 Yuan), and 115% increase in hospitals (28.5 Yuan). Both increases are statistically significant at 1% significance level. For clinics, the price changes in rural communities are quite similar among all three classes, but the price increase in city clinics was much larger than suburban clinics. The distribution of the prices were the same in both

[7] However, pharmacies are playing a more important role in enhancing people's access to health care in China in recent years especially after the new medicine management laws Implemented since September 2002. Under that policy, chapter 3, clause 15, the drug retailers selling prescribed medicines or class 1 non-prescribed medicines should have licensed apothecaries or certified medicine and pharmacology technicians in the stores. The drug retailers selling class 2 non-prescribed medicines should have qualified stuff with their certification verified by the county medicine management department. (Translated from the Medicine Management Law, 2002.)

years; suburban clinics charged the most on average, and poorer village clinics charged the least, which is quite consistent with the income distribution among the communities. For hospitals, the changes are more obvious in rural communities than in the urban communities. The largest amount of increase appeared to be in the suburbs, but it was not the largest percentage increase given suburban hospitals charged a lot more than hospitals in other classes. In all three categories of rural communities, the price of treating flu increased were more than doubled from 1997 to 2006, with the most obvious increase in town hospitals, from just about 15 Yuan to 40 Yuan, increased 173%.

Looking at the distribution of relative price, the increases are no longer as significant as the pattern shown by the absolute price changes, especially in urban area. For clinic visitors, suburban residents experienced smaller increase in service charges than in personal income between and 1997, whereas the price increase in city clinics was relatively larger than the income improvement. Rural areas had the same experience as the city residents regarding to the ratio of the service price and their annual income in the two years, but the magnitudes were much larger. The pattern of the relative hospital charges are very similar to the clinic charges, except that city was the only class that had the relative price decreased instead of suburb. Also, the rural residents suffered more in visiting hospitals than in clinics regarding to the relative price, especially for people in richer villages. According to this measure, although the absolute service prices in urban area increased a lot more than in rural areas, they are relatively better off than the rural residents given the even larger increase in their personal income during the survey period.

Waiting time to be seen by a health practitioner is generally much shorter in clinics than in hospitals. From 1997 to 2006, the waiting time reduced in both types of facilities, with about 2 minutes' reduction in clinics and about 6 minutes in hospitals. The ratio between the waiting time in hospitals and clinics remained approximately 3 in both years. Among different types of communities, urban residents on average wait longer while visiting the health services in both years, with the differences much larger in hospitals than in clinics. However, the gap reduced hugely in 2006 in hospitals, with the enormous drop in cities from 36 minutes to 14 minutes and 28 minutes to 15 minutes in suburban hospitals. Meanwhile, the waiting time in rural hospitals did not change much, except the 3 minutes drop in poorer villages.

Western medicine doctor availability increased from 68% to 74% in clinics and from 91% to 95% in hospitals from 1997 to 2006. The improvements are significant but not large; and not all communities had more western doctors in their health facilities. Availability in city, town and poorer village clinics increased about 8, 4 and 14 percentage points respectively, whereas decreased in suburbs and rich villages by 3 and 2 percentage points respectively. For hospitals, city and poorer village residents had the lowest possibility to be seen by a western-type doctor in 1997. However, they changed to be the two classes with highest western doctor availability in 2006, due to the much large improvement of this measure in these two classes (about 9%) than in other communities (0.3%, 1.4% and –0.3% for suburb, town and richer villages, respectively).

Drug availability in hospitals was over 97% in all communities in 1997, with rich villages being the highest. In 2006, it was close to 1 in almost all communities except the lowest percentage 97.8% in town hospitals. However, the increase was not universal. In fact, drug availability even decreased 0.4 percentage points in richer village hospitals. Therefore, the overall improvement in hospitals is not statistically significant. The availability in clinics, on the other hand, increased a lot in all communities, with an average improvement of 13 percentage points. The increases varied between 8 percentage points to 13 percentage points, with the lowest rate in city clinics in both years, but it also had the greatest improvement. The smallest improvement again was in richer villages.

Methodology

In summary, access to health care in China for the average community significantly changed during the survey period for almost all measures of access. However, the distribution of each measure differed a lot among different types of communities, and it is possible that access improvements also differed in different provinces. Also, the descriptive tables cannot show how much of these changes are related to changes of community income. Therefore, we use multivariate analysis for each access measures to further examine the pattern of the changes and also the reasons behind these changes.

Our model includes as explanatory variables: the relative log income[8], year dummy variable and two sets of location dummy variables, one set controlling for differences across community types and a second set controlling for difference across provinces. Deviation coding is used to define the location dummies instead of the typical indicator coding approach. This gives each dummy variable the value of 1 if the observation is drawn from the corresponding category, -1 if it is from the reference category and 0 otherwise. The coefficients for all dummies in the group are therefore added up to 0. By using this coding system, the coefficients of each location dummy shows the difference of the access measures between each particular location and the overall mean. The advantage of using the deviation coding system is that the coefficients are the same no matter which category is chosen to be the default category. [9] Hence, by running each model twice with different default category, we can easily report the difference between every location and the overall mean for each access measure.

However, because of the different number of communities in each province and each class, coding –1 for the reference category cannot yield the relative differences between each category and the overall mean. Therefore, we modify the location dummies to reflect the size

[8] Relative log income here means the difference between the log per capita income in the community and the overall average of the log income.

[9] Hutcheson, Graeme & Sofronion, Nick, 1999. The multivariate social scientist: introductory statistics using generalized linear models, pp.92. London, Thousand Oaks, Calif. Sage Publications. http://books.google.co.nz/books?id=4C9IbcmqaTMC&pg=PA90&lpg=PA90&dq=deviation+coding&source=bl&ots=LhRSqpmqHx&sig=oTCs_S7E186kFA7JhnxcFtRVlhA&hl=en&ei=rD4KSs-iEJPEtAP569TYCA&sa=X&oi=book_result&ct=result&resnum=4#PPA92,M1

of each group. The deviation contrast coding of the reference category of each location dummy is then the negative of the ratio between the number of communities in the location and the reference category instead of –1, and the weighted sum of coefficients of all categories in the group would result in a total of 0. For example, if city is the reference category and it has 16 communities, the dummy variable indicating town, which has 22 communities will take value 1 if it is town, value -22/16 if it is city and 0 otherwise. Thus, the weighted sum of the coefficients for each set of location controlling variables will add up to 0. We report the coefficients for all levels of the controlling dummy variables in this paper.

The model for examining health care access outcome for community i at time t, $ACCESS_{it}$, is as below, which includes K community type indicators and J province indicators, plus the effect from the log income.

$$Access_{it} = \beta_t * X_{it} + \varepsilon_{it} \qquad (*)$$

Result

Price of Routine Service

The clinic service prices increased significantly from 1997 to 2006. The pattern of the increment seems to reflect the economic situations closely at both the province and community levels. Overall, urban residents paid more for a routine service than rural residents in both years. The routine service charges for a self-pay person in suburban clinics were significantly higher than the average prices in both years, and the difference among classes was stable over the period. The differences among provinces were also significant, but not the same in both years.

In 1997, service prices were not significantly different across different type of communities except that suburban clinics charged more than the average. Moving to 2006, poorer villages' clinics became 15% cheaper than the average clinic, where suburb was still the most expensive place to have clinic services. The gaps between each community type were smaller comparing to 1997. The difference in service charges among provinces was more significant. In 1997, Hubei and Hunan provinces charged 39% and 28% higher than an average clinic, whereas Henan and Guangxi clinics charged 25% and 25% lower. In 2006, the richest provinces Jiangsu experienced massive increase in clinic service prices and became 43% more expensive than an average clinic, with Hubei province to be the second expensive province, but only 35% higher than the average. Guangxi and Guizhou, on the other hand, both experienced much smaller increase in the clinic service prices and became about 32% cheaper than an average clinic. However, per capita income in the community has no significant effect on the clinic service prices.

The location effects on service charges in hospital are more significant in hospitals than in clinics in our reported results, especially from the province indicators. In 1997, city and suburb hospitals charged significantly more than the average, whereas town and richer-village hospitals charged significantly less. Among provinces, Shandong was the one with similar service prices as the average, with Jiangsu, Hubei, Hunan hospital services are more

expensive than the average, and Henan, Guangxi and Guizhou were significantly cheaper. All these effects are on top of the significant income effect, where 10% higher per capita income in the community resulted in 3% higher hospital service prices. In 2006, the gaps between different community types decreased, with suburb hospitals charged higher than the average and hospitals in poorer villages charged 15% less. Combining with the slightly higher service prices in richer villages, the service prices in villages were not that different from the average in 2006 comparing with 1997. The effect from provinces on hospital prices was almost the same from 1997, and remained quite significant.

These results suggest in general, richer communities pay more on hospital services than poorer communities in the whole period. Service prices in clinics from 1997 to 2006 have also been fairly stable for economically disadvantaged communities and provinces. On top of the income effect, the average prices of treating flu for a self-pay person among provinces are very different in both clinics and hospitals, indicating possible different patterns in each place. It is possible that the introduction of the two types of insurance systems gives different effect on different provinces due to their different population compositions, and hence resulted in different service charges on the same disease.

Waiting Time and Staff Quality

Waiting time is a good indicator of whether the quantity of health staff is enough in the facility for the community it intends to serve. But it cannot be used independently as the indicator of whether the health service is improved due to the likely trade-off between quantity and quality. Therefore, we discuss the results of waiting time and staff quality together below.

The staff quality is hard to measure using the household survey information. In this paper, we resemble the previous study using the availability of western medicine doctor as an indicator given that large-scale facilities employ both Western medicine doctors and Chinese medicine doctors, and our sample has fairly small representation of Chinese medicine doctors.

Overall, the waiting time while visiting a clinic decreased about 2.3 minutes from 1997 to 2006. There is no significant difference among the community types. The pattern changed a

bit from 1997 to 2006, with even smaller gaps between communities. Among provinces, Hunan and Guangxi have the waiting time longer than other provinces in 1997, whereas patients in hospitals in Henan were expected to wait 2.8 minutes shorter than other provinces. In 2006, the gaps although narrowed and were less significant, except Guangxi province experienced a slightly weaker improvement than the average and still suffered from the longer waiting time than other provinces. The income effect is not significant in the model for clinic.

Similarly as the waiting time, the western doctor availability also differed more significantly among provinces than across community types. However, these effects are on top of the significant income effects. Overall, 1 more percentage points higher than the average income results in 0.15 percentage point higher in the availability of western medicine doctor. The effect is slightly smaller in 2006, but more statistically significant. In 1997, the patients in town clinics had 14.2 ppt higher chances to be seen by a western medicine doctor, and the advantage remained to be 11.7 ppt in 2006. Richer villages had a 11 ppt lower availability of western medicine doctor in 2006 comparing with the average level. Comparing the provinces, being in Jiangsu and Shandong provinces means the availability of western doctors in the clinics will be 27.8 ppt and 14.7 ppt lower than in other provinces, respectively, whereas being in Guangxi provinces gives a 16.2 ppt higher chances of getting a western doctor. This pattern did not change much in 2006, except the availability in Shandong and Henan were around 11 ppt higher than in other provinces.

The patterns in hospitals on the two measures are different from the clinics, and the magnitude of waiting time is larger. In 1997, the waiting time among community types are significantly different. Patients in urban hospitals waited a lot longer than in rural hospitals. The largest gap was between city and richer villages, where the former was 18.2 minutes longer and the latter was 8.4 minutes shorter, comparing with the overall average. Among provinces, hospitals in Hunan required 11 minutes longer in waiting, where in Guizhou it was 6 minutes shorter. No income effect was caught in this year. In 2006, overall reduce of the waiting time in hospitals was 8 minutes. The pattern among community types was similar as it was in 1997, but the differences were no longer significant. The urban hospitals experienced significant reduction and the rural ones experienced significant increase, which resulted in a much smaller gap of only about 4 minutes between the suburb area (the longest) and the richer villages (the shortest). However, the smaller effects from the community types

were largely because the income effect now is significant on waiting time, with each percentage higher than the overall mean income results in 0.03 minutes longer in waiting time. The story is similar in provinces. The two poorest provinces, Hunan and Guangxi, have the coefficients to be significantly positive; and the two with large increase in income, Shandong and Guizhou, have their coefficients to be significantly negative. The interesting point here is the coefficient for Jiangsu. Visitors to hospitals in Jiangsu were expected to wait 3 minutes longer, despite the already large differences caused from the income effect due to the high per capita income in Jiangsu.

The distribution of western medicine doctors does not show significant differences among community types or provinces. Hunan and Hubei were the only two provinces with significant disadvantage of the western medicine doctor availability, which were about 6 ppt less than the average in 1997 and 2006 respectively. No income impact on the availability in hospitals at all. The overall increase of the availability was 4 percent from 1997 to 2006.

Combining the patterns above, we could see that income effects drove the waiting time in hospitals in 2006, but not in clinics or in 1997. It affected the western medicine availability in a positive way in clinics, but had no impact on hospital doctors. It seems that there might be a trend of western medicine doctors in clinics moving to economically advantaged areas in later years, but this did not cause the quantity reduction in clinic staffs in any area. Hospital staff quality did not show strong relationship with income, but the quantity seemed not to be enough in richer areas.

Drug Availability

The drug availability was very high in both clinics and hospitals during the period in our sample. In 1997, the baseline availability of basic drugs was 85.3% in clinics and 98.5% in hospitals. Richer village facilities had significant higher availability of drugs than the average, especially in clinics in 1997, 14.2 percentage points more; and the measure in town hospitals were significantly lower than an average hospital in that year. In hospitals, provinces were similar in ability of providing basic drugs, except a 1 ppt lower rate in Hubei and 1ppt higher in Guangxi province in 1997. The availability was quite stable from 1997 to 2006 across all provinces with no significant changes or differences in any category.

However, clinics in different provinces behaved very differently in both years of survey. In 1997, economically disadvantaged provinces Guizhou and Guangxi seemed to have higher availability of basic drugs in clinics than other provinces and the order of availability was reverse of the orders in per capita income, except the wealthiest province Jiangsu had similar availability of drugs in clinics. This could be caused by the clinics in poorer areas providing drugs to covering the service costs that they were unable to receive from either the government or the very low service charges comparing with richer areas during the early years. But the pattern is not clear because the income effect is not significant here and Hubei province, which had similar per capita income as Guangxi in 1997, experienced significantly lower availability of drugs in clinics. From 1997 to 2006, the significant differences among strata almost disappeared, except the city clinics still had a 5 ppt lower rate, which was consistent with the pattern shown in Figure 1. The improvement here was universal in all areas, resulted in a 97.4% average availability in basic drugs in 2006.

Conclusion

Starting from 1980s, the public health services in China are no longer fully funded by the central government. Previous study by John S Akin et al. shows that the accesses to health service were not evenly available among communities with different economic strength and locations between 1989 and 1997. Hospitals in economically advantaged communities attracted many health professionals to move from rural or poorer areas. In compensation of that, more clinics were open or changed from hospitals in rural and poor areas providing cheaper but likely to be lower quality health services. Between 1997 and 2006, the increased income differences among richer and poorer provinces, and between urban and rural residents, showed the continuous trend of the uneven economic development in China. However, the unbalanced availability of health care services may be easing due to the medical insurance system reform started from 1998. We use the 1997 and 2006 CHNS data in this paper to examine the change of access to health service in China after the reform.

In this report, we examine four measures indicating different aspects of the access to health care services, which are routine services charges (price of treating flu), waiting time to be seen by a health profession, quality of health care (availability of western medicine doctor) and the availability of basic drugs. Our report shows that unevenness of access to health services did reduced in China during the survey period, although not in all aspects.

Economically disadvantaged communities benefited from the lower service charges in both clinics and hospitals services in 1997. Clinic service prices kept quite stable for those poorer communities and hospital charges in rural area increased a lot less than city hospitals. Especially, the price changes in hospitals are more significant among provinces, with richer provinces increased hospital charges significantly whereas poorer ones remained similar charges apart from the inflation effect, resulted in a huge difference of services prices in different provinces. Apart from the significant and positive income impact on the service prices, the remaining strong gaps between service charges in the provinces are most likely to be caused by the different coverage rate of the coverage of the government supported insurance systems.

The quality and quantity of staff in health services are not that different among communities. Our reports show that the western medicine doctor availability has a strong and significant relationship with income in clinics, indicating a possible higher quality of staff in richer areas. However, the waiting time was also positively related to income in 2006, which might cancel out the advantages they got. In total, the two measures both showed smaller random differences among communities, but a stronger relationship with income in later years, which leave a puzzle of whether the service was better in all areas.

The drug availability was quite different from the other three measures. The economically disadvantaged communities were the ones with higher availability in 1997, and the availability became very high in 2006 for all communities and for both hospitals and clinics. Given the fact that most hospitals were not profit driven due to the policy launched in 2000, it seemed that providing basic drugs became a standard function in almost all health facilities and hence indicating a better health service on that aspect.

In summary, poorer and more rural communities continued to benefit from lower cost of getting health care services, although the smaller increase in their income doesn't mean the service was more affordable in those areas. Some large provinces in our sample did not have household members visiting any clinics during the survey period, indicating a possible better coverage of hospitals in more urban provinces. More rural provinces, on the other hand, still relied heavily on less completion but also relatively more affordable clinic services. Given that the new insurance system for urban and town workers was introduced earlier, we were not surprised that the changes in access to health service were more significant in these areas than the rural communities.

Future Work

Of course, one need to be careful interpreting the findings in this report given our sample is not representative of the Chinese population. Also, one important measure, the distance to hospitals and clinics, is not included in this report. Nevertheless, our report does show some evidence of the improvement of health services in most areas. The disequilibrium between urban and rural areas is likely to be solved by the coming new reform. Xinhua news, 2009,

Jan. 21 reported that ‘China's State Council, or Cabinet, passed a long awaited medical reform plan which promised to spend 850 billion Yuan (123 billion U.S. dollars) by 2011 to provide universal medical service to the country's 1.3 billion population’. This reform plan specially aims to ‘Improve services of grassroots medical institutions, especially hospitals at county levels, township clinics or those in remote villages, and community health centers in less developed cities’, and also ‘Gradually provide equal public health services in both rural and urban areas in the country’ (DZWWW.com). It will be very interesting to see how the new reform could solve the possible issues raised in this report.

Reference

John S Akin, William H Dow, Peter M Lance and Chung-Ping A Loh. Changes in access to health care in China, 1989-1997. *Health Policy and Planning 20 (2).* Oxford University Press, 2005.

Gordon G. Liu, Xiaodong Wu, Chaoyang Peng, and Alex Z. Fu, January 2003. Urbanization and Health Care in Rural China. *Contemporary Economic Policy, Vol. 21, No. 1,* January 2003, 11-24

Xinhua Net, 6th July 2005. History of the medical insurance system reform in China. http://news.xinhuanet.com/newscenter/2005-07/06/content_3184047.htm. Retrieved 8 March, 2009.

National Bureau of Statistics of China, Feb 2007. Statistical Communiqué of the Peoples Republic of China on the 2006 National Economic and Social Development. http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20070228_402387821.htm. Retrieved March 2009.

National Bureau of Statistics of China, March 1998. Statistical Communiqué of the Peoples Republic of China on the 1997 National Economic and Social Development. http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20020331_15392.htm. Retrieved March 2009.

National Bureau of Statistics of China, 2006. The understanding of Total GDP, GDP growth and per capita GDP in China after the China Economics Census. http://www.stats.gov.cn/zgjjpc/cgfb/t20060307_402309437.htm

China Popin, 1997, http://www.cpirc.org.cn/rdzt/rd_gs_detail.asp?id=671 retrieved March 2009

The state council of People's Republic of China, 1998. The decision of establishing the basic medical insurance system of urban and town employees. Retrieved March 2009. http://www.gov.cn/banshi/2005-08/04/content_20256.htm,

The state council of People's Republic of China, September 2002. The medicine management law of People's Republic of China. http://www.gov.cn/banshi/2005-08/02/content_19275.htm Retrieved March 2009.

DZWWW.COM, China passes new medical reform plan. http://www.dzwww.com/english/focus/200901/t20090122_4250629.htm. Retrieved March 2009.

Table 1 Community Distribution in 1997 and 2006

A. Summary Statistics (n=274)

Variable	Mean	Variable description
city	0.117	Equals 1 if in a city
suburb	0.175	Equals 1 if in a suburban area
town	0.161	Equals 1 if in a town
village_rich	0.183	Equals 1 if in a richer village
village_poor	0.365	Equals 1 if in a poorer village
Jiangsu	0.124	Equals 1 if in Jiangsu province
Shandong	0.109	Equals 1 if in Shandong province
Henan	0.153	Equals 1 if in Henan province
Hubei	0.161	Equals 1 if in Hubei province
Hunan	0.131	Equals 1 if in Hunan province
Guangxi	0.161	Equals 1 if in Guangxi province
Guizhou	0.161	Equals 1 if in Guizhou province
year06	0.500	Equals 1 if in year06
suburb06	0.088	suburb*year06
town06	0.080	town*year06
village_rich06	0.091	village_rich*year06
village_poor06	0.183	village_poor*year06
Jiangsu06	0.062	Jiangsu*year06
Shandong06	0.055	Shandong*year06
Henan06	0.077	Henan*year06
Hubei06	0.080	Hubei*year06
Hunan06	0.066	Hunan*year06
Guangxi06	0.080	Guangxi*year06

B. Community Types by Province (n=137)

	City	Suburb	Town	Richer Village	Poorer Village	Overall	Total
Jiangsu	0%	16.7%	4.6%	29.2%	9.8%	12.4%	17
Shandong	0.0%	12.5%	13.6%	16.0%	10.0%	11.0%	15
Henan	25.0%	12.5%	18.2%	12.0%	14.0%	15.3%	21
Hubei	25.0%	16.7%	13.6%	12.0%	16.0%	16.1%	22
Hunan	18.8%	12.5%	13.6%	20.0%	8.0%	13.1%	18
Guangxi	12.5%	16.7%	18.2%	8.0%	20.0%	16.1%	22
Guizhou	18.8%	12.5%	18.2%	0%	24.0%	16.1%	22
Overall	11.7%	17.5%	16.1%	18.2%	36.5%	100%	137
Total	16	24	22	25	50	137	

C. Transition Matrix of Village Type Over the Years (n=75)

1997	2006			Total
	Bottom 25%	Middle	Top 25%	
Bottom 25%	11	13	2	26
Middle	11	21	3	35
Top 25%	0	5	9	14
Total	22	39	14	75

Table 2 Community Per Capita Income Distributions in 1997 and 2006 (Rounded to 1)

A. Per capita income distribution by class in 1997 and 2006

	1997	2006	Change		
	Mean	Mean	Mean	Percentage	Std. Dev.
city	4109	8617	4508***	109.7%	3310.793
suburb	4499	8014	3515***	78.1%	4229.832
town	3757	5565	1808***	48.1%	2505.182
richer village	4689	6919	2230***	47.6%	3331.047
poorer village	2282	4060	1778***	77.9%	1965.641
Overall	3560	6048	2488***	69.9%	3080.966

B. Per capita income distribution by province in 1997 and 2006

	1997	2006	Change		
	Mean	Mean	Mean	Percentage	Std. Dev.
Jiangsu	5213	8465	3252***	62.4%	4144.549
Shandong	4108	7479	3371***	82.1%	4062.057
Henan	3034	6094	3061***	100.9%	3663.667
Hubei	3161	6010	2849***	90.2%	2996.206
Hunan	4186	5927	1741***	41.6%	2712.092
Guangxi	3298	4235	937***	28.4%	1086.396
Guizhou	2560	5112	2553***	99.7%	1998.519
Overall	3560	6048	2488***	69.9%	3080.966

C. Average per capita incomes by province and class in 1997 and 2006

	City		**Suburb**		**Town**		**Richer village**		**Poorer village**	
	1997	**2006**	**1997**	**2006**	**1997**	**2006**	**1997**	**2006**	**1997**	**2006**
Jiangsu			7190	12982	6071	6202	5649	8220	2150	5003
Shandong			6313	12662	3689	5966	4995	7063	2327	5610
Henan	4828	13269	2326	6910	2675	3097	4007	5469	2099	3626
Hubei	4055	7247	3986	7069	2570	5553	3795	9360	2285	3778
Hunan	4736	7493	4621	7286	5328	6785	3990	5231	2835	3959
Guangxi	3384	5125	3659	4940	4383	5020	4349	4161	2491	3475
Guizhou	3080	7695	2956	3935	3396	7211			2052	4061

Table 3 Changes in access to health care between 1997 and 2006 in China (n=274)

	1997	2006	Change (2006-1997)		
	Mean	Mean	Mean	Percentage	Std. Dev.
Clinic					
Price for treating flu	12.597	25.287	12.690***	101%	28.749
Relative service price	3.857	4.908	1.051*	27%	7.771
Waiting time	5.500	3.956	-1.544***	-28%	7.614
Western doctor availability	0.683	0.737	0.054*	8%	0.408
Drug availability	0.865	0.974	0.109***	13%	0.253
Hospital					
Price for treating flu	24.883	53.418	28.535***	115%	44.235
Relative service price	7.384	9.748	2.363***	32%	11.733
Waiting time	17.828	11.365	-6.464***	-36%	17.107
Western doctor availability	0.909	0.953	0.044***	5%	0.161
Drug availability	0.986	0.991	0.004	0%	0.046

* significant at 10%, ** significant at 5%, *** significant at 1%.
Price is measured in 2006 Yuan, waiting time in minutes and Western doctor and drug availability in proportion.

Figure 1 Comparison of average access to health care between 1997 and 2006 for clinics and hospitals

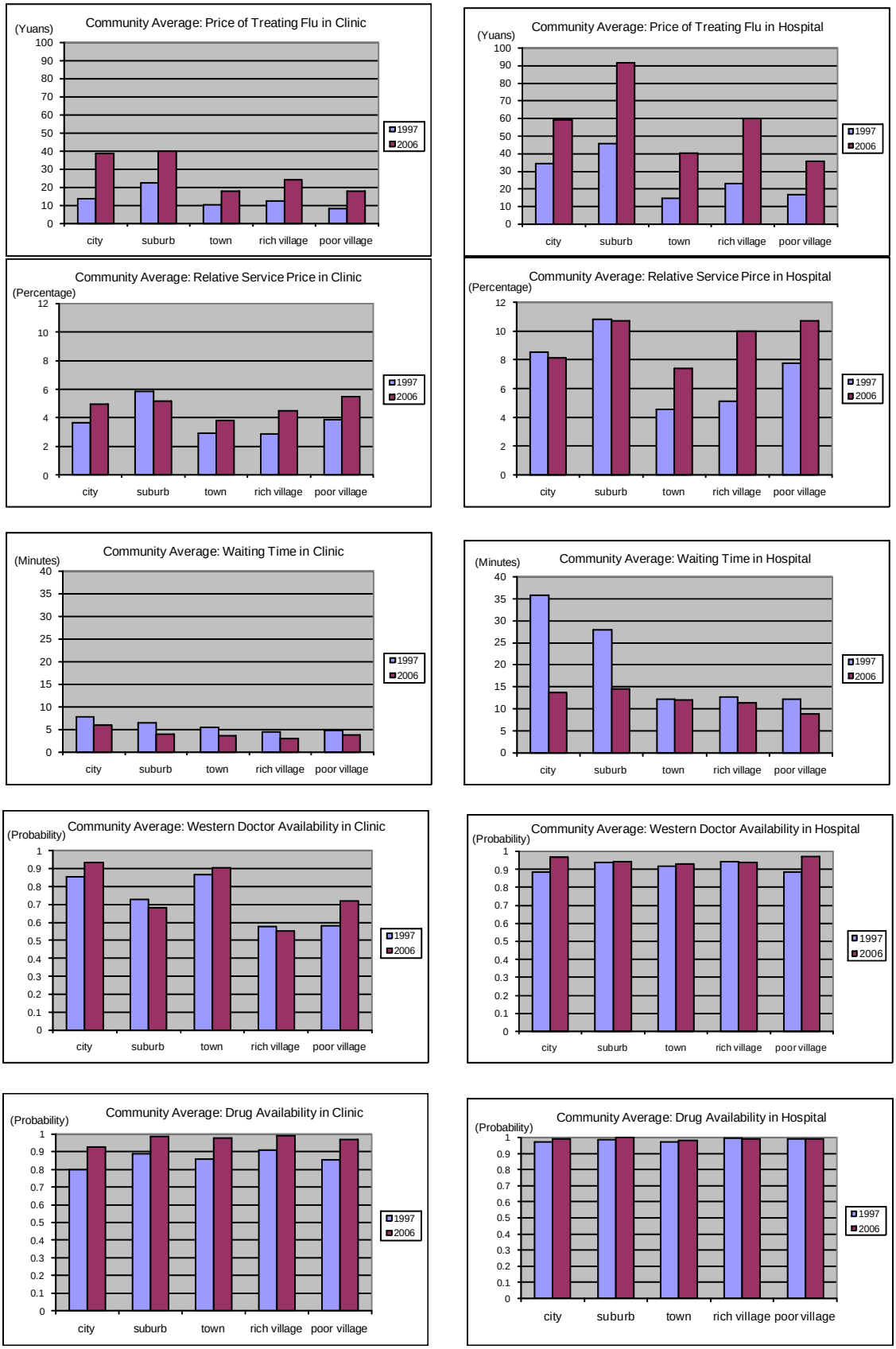

Table 4 Access to clinics services in 1997 to 2006

	Log Price of Treating Flu	Waiting Time to be seen	Western Doctor Availability	Drug Availability
city	0.129	1.518	0.0929	-0.0437
	(0.189)	(1.452)	(0.0808)	(0.0459)
suburb	0.285**	0.256	0.0354	0.0286
	(0.130)	(1.001)	(0.0557)	(0.0317)
town	-0.177	0.127	0.142**	0.00845
	(0.141)	(1.083)	(0.0602)	(0.0342)
village_rich	-0.0627	-1.438	-0.0760	0.0860**
	(0.143)	(1.103)	(0.0614)	(0.0349)
village_poor	-0.0622	0.116	-0.0530	-0.0415*
	(0.0928)	(0.713)	(0.0397)	(0.0226)
city06	0.0747	-0.583	0.0510	-0.00656
	(0.282)	(2.171)	(0.121)	(0.0687)
Suburb06	0.0387	-0.490	-0.105	-0.0154
	(0.186)	(1.428)	(0.0794)	(0.0452)
Town06	0.108	-0.282	-0.0250	-0.00405
	(0.201)	(1.549)	(0.0862)	(0.0490)
village_rich_06	0.0403	0.905	-0.0317	-0.0754
	(0.199)	(1.527)	(0.0850)	(0.0483)
village_poor_06	-0.0872	0.0580	0.0557	0.0407
	(0.123)	(0.946)	(0.0526)	(0.0299)
Jiangsu	0.213	-0.958	-0.278***	0.0609
	(0.174)	(1.335)	(0.0743)	(0.0422)
Shandong	-0.189	-1.918	-0.147*	-0.195***
	(0.176)	(1.353)	(0.0753)	(0.0428)
Henan	-0.254*	-2.812***	0.0380	-0.00348
	(0.140)	(1.075)	(0.0598)	(0.0340)
Hubei	0.390***	1.293	0.0383	-0.0891***
	(0.133)	(1.026)	(0.0571)	(0.0325)
Hunan	0.281*	2.506**	-0.0109	-0.0374
	(0.161)	(1.234)	(0.0687)	(0.0390)
Guangxi	-0.270**	2.386**	0.164***	0.0875***
	(0.122)	(0.939)	(0.0522)	(0.0297)
Guizhou	-0.0753	-1.216	0.0391	0.0851***
	(0.131)	(1.009)	(0.0561)	(0.0319)
Jiangsu_06	0.217	0.238	-0.0749	-0.0479
	(0.247)	(1.901)	(0.106)	(0.0601)
Shandong_06	0.322	-0.0546	0.256**	0.196***
	(0.254)	(1.951)	(0.109)	(0.0617)
Henan_06	0.0913	2.372	0.0678	0.0102
	(0.197)	(1.518)	(0.0845)	(0.0480)
Hubei_06	-0.0430	-1.623	-0.0971	0.0820*
	(0.193)	(1.486)	(0.0827)	(0.0470)
Hunan_06	-0.110	-1.404	-0.104	0.0405
	(0.225)	(1.730)	(0.0962)	(0.0547)
Guangxi_06	-0.0519	0.487	-0.00458	-0.102**
	(0.176)	(1.352)	(0.0752)	(0.0428)
Guizhou_06	-0.237	-0.284	0.0104	-0.0811*
	(0.186)	(1.430)	(0.0795)	(0.0452)
dmloginc	0.244	2.045	0.149*	-0.0546
	(0.189)	(1.455)	(0.0809)	(0.0460)
dmloginc06	-0.152	-1.009	-0.0115	0.0569
	(0.233)	(1.793)	(0.0998)	(0.0567)
year06	0.556***	-2.303***	-0.0153	0.122***
	(0.0998)	(0.768)	(0.0427)	(0.0243)
Constant	2.249***	6.067***	0.721***	0.853***
	(0.0770)	(0.592)	(0.0329)	(0.0187)
Observations	274	274	274	274
Adjusted R-squared	0.302	0.086	0.228	0.172

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 Access to hospital service in 1997 and 2006

	Log Price of Treating Flu	Waiting Time to be seen	Western Doctor Availability	Drug Availability
city	0.313*	18.15***	-0.0308	-0.0128
	(0.176)	(3.030)	(0.0300)	(0.00849)
suburb	0.426***	8.227***	0.0189	-0.000476
	(0.121)	(2.090)	(0.0207)	(0.00586)
town	-0.300**	-5.186**	0.00130	-0.0138**
	(0.131)	(2.260)	(0.0224)	(0.00633)
village_rich	-0.254*	-8.358***	0.0236	0.0128**
	(0.134)	(2.303)	(0.0228)	(0.00645)
village_poor	-0.0402	-2.164	-0.0117	0.00245
	(0.0864)	(1.489)	(0.0148)	(0.00417)
city06	-0.164	-16.64***	0.0619	0.0126
	(0.263)	(4.532)	(0.0449)	(0.0127)
Suburb06	-0.0488	-6.133**	-0.0239	0.00932
	(0.173)	(2.980)	(0.0295)	(0.00835)
Town06	0.147	6.056*	-0.0290	0.00316
	(0.188)	(3.233)	(0.0320)	(0.00906)
village_rich_06	0.294	6.799**	-0.0379	-0.0125
	(0.185)	(3.187)	(0.0316)	(0.00893)
village_poor_06	-0.117	1.285	0.0227	-0.00262
	(0.115)	(1.974)	(0.0196)	(0.00553)
Jiangsu	0.600***	1.796	-0.00836	0.00138
	(0.162)	(2.786)	(0.0276)	(0.00781)
Shandong	0.0161	2.407	0.0127	0.00106
	(0.164)	(2.824)	(0.0280)	(0.00792)
Henan	-0.242*	-2.460	0.0322	-0.00485
	(0.130)	(2.244)	(0.0222)	(0.00629)
Hubei	0.322**	-1.453	-0.00701	-0.0100*
	(0.124)	(2.141)	(0.0212)	(0.00600)
Hunan	0.230	10.98***	-0.0696***	-0.00498
	(0.150)	(2.576)	(0.0255)	(0.00722)
Guangxi	-0.366***	-1.084	0.0200	0.00999*
	(0.114)	(1.960)	(0.0194)	(0.00549)
Guizhou	-0.263**	-5.666***	0.00442	0.00459
	(0.122)	(2.105)	(0.0209)	(0.00590)
Jiangsu_06	0.201	1.425	0.0356	0.00387
	(0.230)	(3.967)	(0.0393)	(0.0111)
Shandong_06	-0.137	-6.969*	0.0190	0.00451
	(0.236)	(4.072)	(0.0403)	(0.0114)
Henan_06	-0.00939	2.054	-0.0234	0.00796
	(0.184)	(3.169)	(0.0314)	(0.00888)
Hubei_06	-0.0622	-0.359	-0.0570*	0.00291
	(0.180)	(3.101)	(0.0307)	(0.00869)
Hunan_06	0.133	-6.872*	0.0661*	0.00247
	(0.210)	(3.610)	(0.0358)	(0.0101)
Guangxi_06	0.104	5.037*	-0.0237	-0.0103
	(0.164)	(2.823)	(0.0280)	(0.00791)
Guizhou_06	-0.196	1.038	0.0146	-0.00563
	(0.173)	(2.984)	(0.0296)	(0.00836)
dmloginc	0.304*	4.829	0.0342	-0.00720
	(0.176)	(3.036)	(0.0301)	(0.00851)
dmloginc06	-0.00571	-1.713	-0.0504	0.00618
	(0.217)	(3.743)	(0.0371)	(0.0105)
year06	0.506***	-8.046***	0.0381**	0.00615
	(0.0930)	(1.602)	(0.0159)	(0.00449)
Constant	2.974***	18.58***	0.919***	0.985***
	(0.0717)	(1.235)	(0.0122)	(0.00346)
Observations	274	274	274	274
Adjusted R-squared	0.462	0.332	0.060	0.018

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1