Determinants of patient choice of medical provider: a case study in rural China

WINNIE C YIP,[1] HONG WANG,[2] AND YUANLI LIU[1]

[1]*Harvard School of Public Health Boston, USA, and* [2]*Training Center for Health Management, Beijing Medical University, Beijing, China*

This study examines the factors that influence patient choice of medical provider in the three-tier health care system in rural China: village health posts, township health centres, and county (and higher level) hospitals. The model is estimated using a multinomial logit approach applied to a sample of 1877 cases of outpatient treatment from a household survey in Shunyi county of Beijing in 1993. This represents the first effort to identify and quantify the impact of individual factors on patient choice of provider in China. The results show that relative to self-pay patients, Government and Labour Health Insurance beneficiaries are more likely to use county hospitals, while patients covered by the rural Cooperative Medical System (CMS) are more likely to use village-level facilities. In addition, high-income patients are more likely to visit county hospitals than low-income patients. The results also reveal that disease patterns have a significant impact on patient choice of provider, implying that the on-going process of health transition will lead people to use the higher quality services offered at the county hospitals. We discuss the implications of the results for organizing health care finance and delivery in rural China to achieve efficiency and equity.

1. Introduction

In China, about 900 million people live in rural areas. This population seeks medical care from a three-tier health care delivery system: village health posts and solo private practitioners, township health centres, and county (and higher level) hospitals. While village health posts are the predominant providers of preventive and primary care services, county hospitals are the main providers of curative care, with township health centres providing a mix of both. Of these three tiers, county hospitals are usually perceived to be the providers of highest quality. They are staffed by physicians with four to five years of medical school training as well as nurses and technicians (Hsiao 1995). In contrast, village health posts are staffed by village doctors with only three to six months of training after junior middle school. Township health centres are usually led by a physician with a three-year medical school education after high school, with support from assistant physicians with two years of medical training beyond junior middle school, and village doctors. Table 1 provides a more detailed description of this three-tier organizational structure.

During the past decade, as China has experienced substantial economic growth, patients' choice of medical provider has also changed drastically. In 1985, 38% of rural outpatient visits were to village health posts, 38% to township health centres, and 14% to county and higher-level hospitals. In 1988, visits to village health posts and township health centres decreased to 28% and 34% respectively, while visits to county and higher-level hospitals grew to 29% (Yu 1992). Other sources of data show similar patterns over a longer period of time. The *Chinese Yearbook of Health* (Editorial Committee of the Chinese Yearbook of Health, 1983 and 1993) indicates that between 1982 and 1992, annual visits to county (and higher-level) hospitals increased by 26.4%, from 1.138 billion to 1.439 billion. In contrast, visits to township clinics decreased by 27.1%, from 1.419 billion to 1.034 billion.[1] While previous literature has studied demand for health care in rural China (e.g. Cretin, 1990), most have focused on the level, or the probability, of use. Of those that have documented patient choice of medical provider, none has gone beyond the descriptive level to analyze determinants affecting individual choice of medical provider.

What is the pattern of medical provider choice for rural Chinese residents? What are the factors

Table 1. Characteristics of the three-tier health care delivery system in rural China

Characteristics	Level of organization		
	Village health post	Township health centre	County hospital
Number of staff	2	23	126
% with MD degrees	0%	0.4%	11.2%
Number of beds (Occupancy Rate)	0	16 (38.6%)	130 (77.5%)
Equipment value (in 1000 yuan)	14.87	47.94	2071.00

Data source: Ministry of Health 1994.

affecting their choices? Based on data from a household survey in Shunyi county of Beijing, China, in 1993, this study uses a multinomial logit model to address these questions. The study pays particular attention to three factors that are hypothesized to affect patient demand, namely insurance status, income, and disease pattern.

Understanding patient choice of medical provider in the rural three-tier health care delivery system is of considerable policy significance. In the 1970s, rural health care in China was organized and financed through the Cooperative Medical System (CMS), which was an integral part of the overall collective agricultural production system and social services. Under CMS, more than 90% of the rural population was covered. Following the agricultural reform in the early 1980s, CMS largely collapsed, and the majority of the rural population was left with no form of coverage (Hsiao 1984). Recently, CMS has been re-established in some areas (Liu 1992); in 1993, CMS covered about 10% of the rural population (Center for Health Statistical Information 1994).

The Chinese government has announced a policy re-establishing improved forms of rural CMS (Yuan and Chen 1993), and recently re-affirmed this intention in the Decision of the Central Committee of the Chinese Communist Party and the State Council on Health Reform and Development in January 1997 (Central Committee 1997). According to the Decision, rural health is a national priority, and one method of achieving this is to 'take the initiative to develop and improve the system of cooperative medical services' (ibid, p. 13). The extent to which CMS affects patient use of medical services is still largely under-studied. Experiences of currently existing CMS thus provide important information for guiding policy-making in organizing rural health care financing and delivery.

With economic reform well under way in China, the income of rural residents continues to grow. To what extent, and how, income affects patient choice of provider can have important implications for future health care expenditures. While services provided at the county level are perceived to be of the highest quality, they are also the most costly. The National Health Survey of China in 1993 estimated that, on average, health expenditure per outpatient visit at county hospitals was 11 RMB yuan (US\$1 = 8 RMB yuan), compared to 8 RMB yuan at township health centres, and 4 RMB yuan at village health posts. If the demand for quality is income elastic, demand for county-level services will increase relative to demand for lower-level providers as income grows. Then, a financing system based on the calculation of current cost estimates will not be sustainable, as more demand shifts toward the county level in the future.

In addition to economic factors, epidemiological profile as well as severity of illness may constitute important determinants of people's decisions in choosing providers. As disease patterns change, patient choice of provider may change in response. Planning of supply capacity, which was largely based on a quota-driven system in the past, should take this into account.

The next section presents the estimation methods and empirical specification. Section three describes the data. Section four presents the results of the empirical

analysis. The last section concludes with a discussion of policy implications.

2. Method

Patient choice of medical provider is a discrete decision, consistent with qualitative choice models. In the context of the current study, an individual can choose among four alternatives: self-treatment, treatment from village doctors (which includes doctors at village health posts and solo private practitioners),[2] treatment from township health centres, and treatment from county (or higher-level) hospitals. The choice of provider depends on characteristics of the alternative providers, such as proximity and quality, and characteristics of the patients themselves, such as insurance coverage, income, health status, education, age, gender, etc.

An individual chooses among alternatives based on the utility derived from each alternative. More specifically, we can follow McFadden (Manshi and McFadden 1983) to posit that the utility of choice j to individual i is U_{ij}:

$$U_{ij} = V_{ij}(M_j, INS_i, INC_i, H_i, Z_i,) + \epsilon_{ij} \quad (1)$$

where V(M,H,E,Z) represents utility determined by observed data.

M is a vector of provider characteristics.

INS is the individual's insurance status.

INC is the individual's income level.

H is a vector of individual health status indicators.

Z is a vector of other individual characteristics.

ϵ is a vector of unobserved components, which will be treated as random noise.

j denotes provider choice alternatives (0 = self-treatment, 1 = village level, 2 = township level, 3 = county and higher-level).

Utility maximization implies that individual i will only choose a particular alternative j if $U_{ij} > U_{ik}$, for all k not equal to j. Since ϵ is assumed to be random, $U_{ij} > U_{ik}$ is also a random occurrence. The probability of any given alternative j being chosen by an individual can be expressed as:

$$P_j = P(U_{ij} > U_{ik}) \quad \text{for all } k <> j \quad (2)$$

By substitution of (1),

$$P_j = P(V_{ij} + \epsilon_{ij} > V_{ik} + \epsilon_{ik}), \quad \text{for all } k <> j$$

Rearranging,

$$P_j = P[(\epsilon_{ij} - \epsilon_{ik}) > (V_{ij} - V_{ik})] \quad \text{for all } k <> j \quad (3)$$

By knowing the distribution of the random ϵ's (though not their particular values), we can derive the distribution of each difference $\epsilon_{ij} - \epsilon_{ik}$ for all j, j < > k. By using equation (3), we can calculate the probability that the patient will choose alternative j.

Letting $X_{ij} = (M_j, INS_i, INC_i, H_i, Z_i)$ and assuming V() to be a linear function of the components of X, we operationalize Equation 2 as:

$$U_{ij} = \beta_j X_{ij} + \epsilon_{ij} \quad (4)$$

where β_j is a vector of coefficient values indicating the effect of the various X_{ij}'s on individual i's utility for option j. Note that β_j is subscripted by the choice index j. This means that in our analysis, a given X_{ij} is allowed to 'interact' with each choice option. For example, age may have one effect on the utility of treatment at a village post, and another for treatment at the township centre.

The most widely used qualitative choice model is logit. Since the patient's alternative choices are more than two, we adopted the multinomial logit model (MNL) in this study. Assuming that each ϵ_{ij} for all alternatives j is distributed independently and identically in accordance with the extreme value distribution, the probability that a patient will choose alternative j is given by equation (5):

$$Prob(Option_j | X_{ij}) = \frac{exp(\beta_j X_{ij})}{\sum_{k=0}^{3} exp(\beta_k X_{ik})}$$

The parameters of this model can be estimated using maximum-likelihood methods.

The MNL model requires that the 'independence of irrelevant alternatives' (IIA) assumption be satisfied. This assumption, however, is not realistic in many situations. Recent work has indicated that the IIA assumption in the MNL model is not as restrictive as it first seems (Train 1990). An alternative to the MNL model is the nested logit model. However, as will be explained in the data section, since all our right-hand-side variables are individual characteristics, the nested logit model will essentially produce the same results as the MNL model (Econometric Society 1982).

In our data the unit of observation is the individual. About one-third of the observations involve individuals from the same household. Since errors for observations from the same household are correlated with each other, we corrected for these clustering effects to produce robust standard errors.

3. Data and variables

This study is based on data collected from a household survey in Shunyi county, conducted by Beijing Medical University during the summer of 1992 and spring of 1993. Shunyi county is located in the eastern suburbs of Beijing, with a population of 530 000. Among 2240 counties in rural China, the value of the total product (which includes both industrial and agricultural production) of Shunyi county ranked 39 (Chinese Yearbook of Rural Statistics, 1993). This indicates that our sample represents a relatively rich rural population in China. This county has one county hospital, and each township in the county has its own township health centre. Six villages were selected as sampling units. The villages are located between 16–20 kms from the county hospital, and each village has its own village health post.

A stratified sampling method based on income level was adopted in order to arrive at a sample representative of the county's economic status. The whole sample was then split into four sets, and the households within each set were interviewed in four different seasons. The entire sample includes 2244 households and 8853 individuals; the response rate was 95.4%.

At the core of this data is the two-week medical service utilization survey. Individuals were asked whether they used any medical services (or treatment) during the two weeks preceding the survey. The sample used for MNL analysis includes 1877 users. Among these, 22% (N = 413) opted for self-treatment, 52% (N = 985) saw village doctors, 13% (N = 242) went to township health centres, and 13% (N = 242) sought care at the county hospital or higher-level facilities.

Other data collected that were used in the analysis are detailed below.

Insurance status

There are four main types of insurance status: Government Health Insurance (GHI), Labor Health Insurance (LHI), cooperative medical scheme (CMS), and no insurance (self-pay: fee-for-service). The GHI covers government employees, retirees, disabled veterans, and university teachers and students. The LHI covers employees, retirees, and their dependents, of state enterprises (enterprises owned and managed by central and provincial governments) with more than 100 employees. Smaller state enterprises and industries owned by county or township governments can provide LHI on a voluntary basis. Beneficiaries of both programmes can receive largely free outpatient and inpatient medical services. Recently, GHI has introduced a 10% copayment for outpatient care. Similarly, LHI has introduced copayments for outpatient services, with the level varying according to the financial situation of the enterprises. Although details of coverage for each type of service were not collected in this survey, we expect that since Shunyi is a relatively wealthy county, coverage should be relatively comprehensive. In contrast, people covered by CMS are usually only reimbursed for medical expenditures incurred at their own village health post, but not at township- or county-level facilities. In our sample, 1% is covered by GHI, 6% by LHI, and 39% by CMS.

Health insurance changes the effective price that individuals face for using medical services. When making choices regarding which medical provider to visit, individuals choose the one which gives them the highest utility. Since utility denotes increasing quality and decreasing prices, the ultimate choice of provider reflects the relative trade-off between price and quality (conditional on other factors) that individuals prefer. Given that county facilities are perceived to have the highest quality of the three tiers, insurance coverage for county hospitals reduces the relative price of quality at county hospitals, thus increasing the probability that county hospitals are chosen over other providers. In contrast, by only covering village-level visits, CMS increases the relative price of quality of care and is hypothesized to reduce a patient's probability of choosing a county-level facility rather than a village clinic.

Income

Income reflects people's ability to pay. As income grows, peasants are increasingly willing to pay higher out-of-pocket costs to obtain better quality service from county hospitals, bypassing lower level facilities. We created dummy variables to indicate low, middle, and high income groups (representing 22%, 60%, and 18% of 1877 patients, respectively).

The higher the income, the more likely a county hospital will be chosen over other modes of treatment.

Disease pattern

Two sets of variables are included to control for health status: chronic disease history and disease pattern. Disease pattern includes ten dummy variables based on ICD-9 codes (International Classification of Disease, 9th edition), which represents the top ten most frequent causes of medical service utilization. Ideally, severity of illness should be controlled for since the different levels of facilities specialize in treating health problems of different severity levels. Unfortunately, such data were not collected in the survey. However, to the extent that severity of illness is not correlated with insurance status and income, the coefficient estimates for these key independent variables will remain unbiased. Since insurance status is largely determined by employment, the non-correlation assumption between insurance status and severity of illness should be valid. As for income, one may argue that income is negatively correlated with severity of illness. By controlling for disease pattern and using household-level (as opposed to individual-level) of income, we hope to reduce such correlation, if it does exist.

Other variables

Additional variables include demographic variables such as age, gender, marital status, occupation, and education background, and seasonal variables to adjust for seasonal differences in patient use of medical care.

Table 2 describes the variables and their summary statistics. Compared to national averages in rural China, our sample has a much higher representation of CMS coverage. The 1993 National Health Services Survey estimated that only 9.81% of the rural population was covered by CMS, and 84.11% was self-pay. However, our sample of patients includes 39% CMS, and only 54% self-pay.[3]

4. Results

Table 3 describes the percentage distribution of types of providers visited. It is evident that GHI and LHI beneficiaries are more likely to use county-level facilities, while patients covered by CMS tend to visit village health posts. This pattern can be explained by the insurance effect, but it may also be a result of GHI/LHI individuals living closer to the county seat, and hence facing lower transportation and time costs for visiting a county hospital. Alternatively, the pattern may be due to higher incomes among GHI/LHI individuals. Therefore, without controlling for income and other factors, we cannot conclude to what extent higher use of country hospitals is due to the insurance effect.

It is worth noting that of the three types of insurance status, the CMS group is least likely to use self-treatment. If the goal of insurance coverage for the rural population is to encourage use, this would be preliminary evidence in support of the re-establishment of CMS.

Table 3 also shows that high-income patients are more likely to visit county hospitals than middle- and low-income patients, while low-income patients are more likely to visit village-level doctors. However, the high-income group is also more likely to choose self-treatment relative to the other population groups, perhaps reflecting higher opportunity cost (in terms of forgone income) for seeking formal treatment.

The results of the multinomial logit (MNL) estimation are presented in Table 4. We also present relative risk ratios (RRR) for each treatment mode (choice j) given a particular characteristic (X_{ij}). Since all our right-hand-side variables are dummy variables, the RRR can be interpreted as the relative probability of choosing alternative j to self-treatment (the comparison group for the MNL estimation) for individuals with a particular characteristic, compared to those in the omitted group. Using insurance status as an example, the RRR for CMS patients choosing village doctors is $[Pr(village)/Pr(self-treatment)]_{CMS}/[Pr(village)/Pr(self-treatment)]_{SELF-PAY}$, and is equal to 2.43. That is, people covered by CMS are 2.43 times as likely to choose village level doctors over self-treatment, when compared with similar self-pay individuals. The ratio of the RRRs for county to village providers, therefore, indicates the relative probability of choosing county to village visits for CMS individuals, relative to self-pay individials.

To assist interpretation, Table 5 presents predicted probabilities based on the MNL results. Of the actual users, we correctly predict 72.0% of village level choices, 72.7% for township health centres, 72.3% for county hospitals, and 75.3% for self-treatment. The overall correct prediction rate for the MNL model across the four choices is 72.9%.

Table 2. Description of variables

Variable	Description	Mean (S.D.)
GHI/LHI	1 if covered by Government or Labor Insurance, 0 otherwise	0.07 (0.26)
SELF-PAY*	Fee-for-service patients. Omitted group.	0.54 (0.50)
CMS	1 if covered by CMS, 0 otherwise	0.39 (0.49)
L-income	1 if income $\leq$ =700 yuan, 0 otherwise	0.22 (0.42)
M-income*	Income >700 and $\leq$ =1600 yuan. Omitted group.	0.60 (0.49)
H-income	1 if income >1600, 0 otherwise.	0.18 (0.38)
D-ARI	1 if acute respiratory infection, 0 otherwise	0.46 (0.50)
D-DIGEST	1 if digestive system disease, 0 otherwise	0.09 (0.29)
D-HRT	1 if heart disease, 0 otherwise	0.06 (0.24)
D-HYPER	1 if hypertension, 0 otherwise	0.05 (0.21)
D-PULMON	1 if obstructive, pulmonary disease, 0 otherwise	0.04 (0.19)
D-INJURY	1 if injury, 0 otherwise	0.03 (0.18)
D-MUSKEL	1 if musculo-skeletal disease, 0 otherwise	0.04 (0.19)
D-ORAL	1 if oral disease, 0 otherwise	0.02 (0.14)
D-INFECT	1 if infectious disease, 0 otherwise	0.03 (0.16)
D-MENTAL	1 if mental health problem, 0 otherwise	0.02 (0.14)
D-OTHER	Other. Omitted group.	0.17 (0.38)
Chronic	1 if have chronic disease history in the past 3 months, 0 otherwise	0.46 (0.50)
Age 0-14	1 if age $\leq$ =14, 0 otherwise	0.22 (0.41)
Age 15-60*	age >14 and age $\leq$ = 60. Omitted group.	0.59 (0.49)
Age 60	1 if age >60, 0 otherwise	0.19 (0.39)
Male	1 if male, 0 otherwise	0.43 (0.50)
Unmarried	1 if unmarried, 0 otherwise	0.35 (0.48)
Illiterate	1 if years of education=0 and age >6, 0 otherwise	0.26 (0.44)
Kindergarten	1 if kindergarten education, 0 otherwise	0.26 (0.44)
Primary	1 if primary and above education, 0 otherwise	0.34 (0.38)
Children*	Children under age of 6. Omitted group.	0.14 (0.34)

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Variable	Description	Mean (S.D.)
Farmer	1 if farmer, 0 otherwise	0.22 (0.41)
Salaried	1 if salaried worker, 0 otherwise	0.25 (0.43)
Other*	Children, students, housewives. Omitted group.	0.53 (0.50)
Summer	1 if survey fielded in summer, 0 otherwise	0.24 (0.43)
Autumn	1 if survey fielded in autumn, 0 otherwise	0.20 (0.40)
Winter	1 if survey fielded in winter, 0 otherwise	0.34 (0.48)
Spring*	Omitted group	0.22

* Indicates the omitted group in the MNL analysis.

Table 3. Percentage distribution by provider type

Variable	Self-treatment	Village health post	Township health centre	County hospital
Total	22%	52%	13%	13%
GHI/LHI	32	27	15	26
SELF-PAY	28	47	12	13
CMS	11	64	14	11
L-income	19	55	15	11
M-income	22	53	13	12
H-income	24	47	12	17
D-ARI	15	73	7	5
D-DIGEST	33	35	18	14
D-HRT	36	27	13	24
D-HYPER	39	41	8	12
D-PULMON	36	47	12	5
D-INJURY	20	44	15	21
D-MUSKEL	36	25	24	15
D-ORAL	13	54	20	13
D-INFECT	6	31	29	34
D-MENTAL	26	24	24	26
D-OTHER	22	33	19	26
Chronic	29	39	14	18
Non-chronic	16	64	11	9

Table 4. Multinomial logit results

Variable	Village health post Coef. (St. Error)	RRR	Township health centre Coef. (St. Error)	RRR	County hospital Coef. (St. Error)	RRR
GHI/LHI	−0.510 (0.335)	0.60	0.089 (0.445)	1.09	0.256 (0.349)	1.29
CMS	0.889* (0.522)	2.43	0.112 (0.656)	1.11	−0.209 (0.563)	0.81
L-income	0.283 (0.202)	1.32	0.390 (0.254)	1.48	0.156 (0.279)	1.11
H-income	−0.055 (0.232)	0.95	0.005 (0.303)	1.01	0.268 (0.261)	1.31
D-ARI	0.794*** (0.209)	2.21	−0.750*** (0.279)	0.47	−1.529*** (0.281)	0.22
D-DIGEST	−0.256 (0.262)	0.77	−0.560* (0.315)	0.57	−1.150*** (0.313)	0.32
D-HRT	−0.486 (0.287)	0.62	−0.716* (0.355)	0.48	−0.367 (0.308)	0.69
D-HYPER	−0.118 (0.296)	0.89	−1.298*** (0.458)	0.27	−1.244*** (0.402)	0.29
D-INJURY	0.412 (0.410)	1.51	−0.026 (0.526)	0.97	0.081 (0.476)	1.08
D-PULMON	−0.089 (0.320)	0.92	−0.684 (0.460)	0.50	−2.017*** (0.568)	0.13
D-MUSKEL	−0.820** (0.364)	0.44	−0.412 (0.387)	0.66	−1.271*** (0.414)	0.28
D-ORAL	0.883* (0.526)	2.42	0.357 (0.640)	1.42	−0.289 (0.687)	0.75
D-INFECT	0.835 (0.678)	2.30	1.348* (0.686)	3.85	1.150* (0.667)	3.16
D-MENTAL	−0.447 (0.491)	0.64	−0.155 (0.510)	0.86	−0.273 (0.447)	0.76
Chronic	−0.143 (0.169)	0.87	0.027 (0.234)	1.03	0.479** (0.235)	1.61
Age <=14	0.379 (0.377)	1.46	−0.461 (0.512)	0.63	0.693 (0.546)	2.00
Age >60	−0.214 (0.233)	0.81	−0.849*** (0.327)	0.43	−0.439 (0.323)	0.64
Male	0.145 (0.141)	1.16	−0.087 (0.197)	0.92	0.078 (0.198)	1.08
Unmarried	−0.186 (0.215)	0.83	0.172 (0.273)	1.19	−0.054 (0.318)	0.95
Illiterate	−0.689* (0.401)	0.50	−0.955* (0.543)	0.38	−0.275 (0.564)	0.76
Kindergarten	−0.437 (0.332)	0.65	−0.582 (0.457)	0.56	0.058 (0.490)	1.06
Primary	−0.372 (0.375)	0.69	−0.919* (0.509)	0.40	0.246 (0.539)	1.28
Farmer	0.236 (0.231)	1.27	0.198 (0.301)	1.22	0.195 (0.294)	1.22
Salaried	−0.197 (0.226)	0.82	0.018 (0.296)	1.02	0.282 (0.287)	1.33
Summer	−0.503 (0.570)	0.60	−0.365 (0.683)	0.69	−1.208*** (0.604)	0.30
Autumn	−0.413* (0.293)	0.66	0.093 (0.366)	1.10	0.043 (0.354)	1.04
Winter	−0.131 (0.552)	0.88	−1.474*** (0.706)	0.23	−1.025** (0.584)	0.36

Self treatment is the comparison group
*: P< = 0.10; **: P< =0.05; ***: p<=0.01
Number of observations = 1877
F(81,1047) = 5.10
Prob > F = 0.0000

Table 5. Predicted probabilities of patient choice of different medical providers

Variable	Self-Treatment	Village health post	Township health centre	County Hospital
GHI/LHI	27.5%	33.9%	17.4%	21.2%
SELF-PAY	24.1	45.9	14.5	15.5
CMS	15.7	64.5	10.9	8.5
L-income	18.8	54.7	14.7	11.8
M-income	23.0	52.1	12.5	12.5
H-income	22.6	49.6	12.2	15.6
D-ARI	19.1	65.6	8.5	6.8
D-DIGEST	29.6	38.5	16.2	15.6
D-HRT	27.6	28.6	12.9	30.8
D-HYPER	31.0	45.8	8.3	14.9
D-INJURY	16.7	40.2	14.9	28.2
D-PULMON	31.0	47.0	15.1	6.9
D-MUSKEL	34.9	26.5	22.2	16.4
D-ORAL	13.9	52.1	17.8	16.3
D-INFECT	8.0	28.7	26.2	37.2
D-MENTAL	24.6	26.2	19.5	29.7
D-OTHER	19.6	31.9	17.9	30.6
Chronic	22.2	49.3	13.0	15.5
Non-chronic	22.2	54.8	13.0	10.1

Insurance status

GHI or LHI coverage is associated with a higher likelihood of visiting county-level facilities, and a lower likelihood of visiting village level doctors. Relative to self-pay individuals with similar characteristics, GHI/LHI beneficiaries are 2.15 (1.29/0.6) times as likely to choose a county hospital, and 1.89 (1.09/0.6) times as likely to choose a township health centre, than to choose a village doctor. However, the differences are not statistically significant at the 95% level. This may in part be due to our small sample size of GHI/LHI beneficiaries. In contrast, villagers covered under CMS are more likely to visit village health posts, and less likely to visit township or county level facilities. Compared with self-pay individuals, the CMS sample is 2.2 (2.43/1.11) and 3 (2.43/0.81) times more likely to seek treatment at the village clinics than township health centres and county hospitals, respectively.

These results taken together imply that GHI/LHI individuals are 6.5 times (1.29/0.6)/(0.81/2.43) as likely to choose a county hospital, and 4 times as likely to choose township health centres, over village doctors, than individuals covered by CMS. However, CMS individuals are more likely to visit a village health post than to use self-treatment, when compared to both GHI/LHI individuals (4 times) and the

self-pay group (2.4 times). As Table 5 shows, only 15% of the time do CMS individuals choose self-treatment, while GHI/LHI and self-pay individuals choose to use self-treatment 27% and 24% of the time, respectively.

These findings might seem counter-intuitive since the GHI/LHI beneficiaries face almost zero monetary price for formal care, but the higher use of self-treatment by GHI/LHI individuals is a phenomenon commonly observed in China, as these individuals have more access to supply of drugs and information on types of drugs to use (Center for Health Statistical Information, 1994). Very often, left-over drugs dispensed for one episode are used for future illnesses. Using a rural sample from the National Health Survey of 1993, Rao (1997) estimates that, controlling for standard socioeconomic factors as well as severity of illness, GHI/LHI beneficiaries are twice as likely to choose self-treatment as self-pay patients, whereas CMS patients are 20% less likely to opt for self-treatment compared to self-pay patients. Both results are statistically significant (Rao 1997).

Our results are consistent with patterns of utilization by insurance types. GHI/LHI individuals normally face a zero monetary price of medical care. In the absence of a price constraint, they prefer to choose

providers believed to be of higher quality. On the other hand, most of the newly re-established CMS only cover health expenditures incurred at the village health post. CMS patients thus face a discounted price at the village level and hence are more likely to seek services at the village level.

In attributing the difference in the choice of provider for individuals with different insurance coverage to the insurance effect, one caveat is warranted. Relative to other villagers, GHI/LHI beneficiaries tend to reside closer to the county seat, and hence are more likely to visit the county hospital as a result of lower transportation and/or time costs. Unfortunately, without data collected on the distance between residence and county hospital, the distance and insurance effects cannot be separated empirically. It should be noted, however, that the sample villages are at least 16 km from the county hospital. By having insurance coverage for county hospital services, GHI/LHI beneficiaries are almost 29% times more likely to seek care at the county hospital (21% vs 15.5%) than self-pay patients. This implies that distance may not be a very critical determinant of choice of provider, at least in this sample of individuals.

Income

Consistent with expectation, individuals of higher income are more likely to use county-level facilities than low-income individuals. However, this income effect is not as strong (both in magnitude and statistical significance) as the insurance effect described earlier. High-income individuals are 1.6 and 1.4 times as likely to choose county over village providers as low-income and middle-income individuals, respectively. However, they are almost equally likely to choose township health centres over village doctors as the other two income groups. The consistently positive RRRs for the low-income group also indicate that low-income individuals are more likely to use some kind of formal treatment over self-treatment, compared to the other income groups. The predicted probabilities in Table 5 reveal that among the three income groups, the low-income group has the lowest probability of using self-treatment. This may reflect the higher opportunity cost of seeking formal treatment for higher income individuals.

Disease pattern

The results regarding disease pattern variables suggest that as the disease pattern changes in China, demand for services from the different levels of

provider will change accordingly. In particular, our results show that individuals who had a chronic disease history in the last three months were twice as likely to visit county hospitals than village health posts. We also found that disease patterns contribute significantly to explaining the variation in the pattern of utilization. Inclusion of the disease variables as explanatory variables doubles the pseudo R^2 from 0.0746 to 0.1373. (Unfortunately, however, the data does not allow us to control for severity of illness within a given disease category.)

Other demographic variables

Patient demographic characteristics, such as gender, marital status, and occupation, do not significantly affect patient choice of medical provider. Relative to younger people, the elderly (those over 60 years old) are more likely to use self-treatment over formal treatment, although the results are not statistically significant except for township health centres. This pattern is also observed in the National Health Survey (Center for Health Statistical Information, 1994), which covers a national sample. That survey also found that although the over-60 sample has similar, or slightly lower, utilization rates than younger individuals (controlling for other factors), their expenditures are significantly higher. Without further analyzing the impact of age on total health resources used in this sample, it would be unwarranted to conclude that the aging population of China will not demand more resources in the future based purely on utilization rates.

The results of the education variables again suggest that, controlling for other factors, township health centres are the least preferred providers across the different groups of education attainment. Individuals with no education are significantly less likely to visit a village doctor or township health centre than to use self-treatment. Individuals with at least primary-level education are also significantly less likely to visit a township health centre than to use self-treatment.

Conclusion and policy implications

This analysis represents the first effort to study patterns of utilization in the three-tier medical care system in rural China using a sophisticated econometric technique. The results can help policymakers to understand patient health-seeking behaviour, and thus provide important information on designing future health policies. Our results show that insurance coverage is an important determinant

of patient choice of medical provider in the three-tier medical system. When making choices regarding which medical providers to visit, individuals trade off price and quality, choosing the provider that gives them the highest utility. By offering insurance coverage for services at county hospitals, perceived to have the highest quality, GHI/LHI reduces the relative price of quality. As a result, GHI/LHI beneficiaries are more likely to choose county hospitals.

Based on the model estimation, self-pay patients are predicted to have probabilities of 46%, 14.5% and 15.5% of visiting village health posts, township health centres, and county hospitals, respectively. Through the provision of (almost) full coverage, GHI/LHI beneficiaries' probability of visiting a county hospital increases from 15.5% to 22%, while the probability of visiting a village health post decreases from 46% to 34%, compared to self-pay patients. In contrast, by providing coverage only for village visits, CMS significantly increases the price of quality care at county hospitals relative to village clinics, encouraging patients to choose village-level clinics. Thus, relative to individuals without any form of insurance coverage, CMS villagers have almost a 50% higher probability of visiting a village doctor and 50% lower probability of using a county hospital.

Currently, about 90% of the rural population in China is not covered by any form of insurance. The Chinese government has already announced its commitment to re-establishing the cooperative medical system in rural areas. An important component in the process of re-establishing CMS is the design of benefit packages. The results of this study show that, consistent with economic theory, price is important in determining patient medical-care-seeking behaviour. In particular, providing coverage at the village level significantly increases a patient's probability of choosing a village-level provider. To the extent that village-level visits are mainly focused on preventive and primary care, and that these services are cost-effective, future CMS should consider providing relatively generous coverage for villagers to encourage them to choose village rather than higher level providers.

Our results also show that having CMS coverage significantly increases an individual's probability of seeking formal treatment. This result is of particular interest for poverty areas. Our data cannot prove whether health status improves by using formal treatment, nor can we show whether increased use leads to over-utilization. Nevertheless, to the extent that financial constraints on individuals in poverty areas lead to under-utilization of health services, and that there is evidence of a vicious cycle of illness and poverty (China Network, 1995), increasing visits to formal health care providers is likely to improve both the health status and economic well-being of these individuals.

An important message of our results is that any health care system needs to be dynamic, rather than static, to keep pace with people's changing demands and needs. With economic reform under way, incomes in China continue to grow. At the same time, rural areas are experiencing an epidemiological transition. Chronic and degenerative diseases are becoming the major cause of health problems (World Bank 1993). Both factors imply greater utilization of county-level providers, leading to increasing health care expenditures. For any form of organized financing to be viable and sustainable, people's demand behaviour must be taken into account. Similarly, the planning of supply capacity needs to be responsive to demand in order to allocate resources efficiently.

The results on income also have important implications for equity. Under the laissez-faire policy, the allocation of health resources has largely been dictated by patient ability to pay. As our results show, individuals with higher incomes are willing to pay higher costs to bypass village-level facilities and visit county hospitals. At the same time, in an effort to modernize tertiary care, the government has shifted more of its resources from primary care services to hospitals (Hsiao 1995). As resources at county hospitals are mostly used by individuals with higher incomes, most of the public resources end up subsidizing the rich rather than the poor (i.e. individuals with GHI/LHI coverage rather than those without coverage).

In rural China, there is wide disparity in the training and background of medical personnel at the three levels of facilities, as described in Table 2. Since quality is highly correlated with training of medical staff, the fact that higher income individuals use more county-level services relative to lower income individuals also implies that there may be inequity in the quality of services received. Therefore, from both efficiency and equity points of view, it is advisable to allocate more public resources to improving the quality, and encouraging the use, of village-level facilities.

This study has analyzed patient health-seeking behaviour using a multinomial logit model. It represents the first effort to identify and quantify the significance of individual factors in determining patient choice of provider for the rural population of China, thus providing considerable information for policy-makers in designing its financing and delivery system for rural China. However, the data are restricted to one county, Shunyi county in Beijing. Another limitation is that we could not control for severity of illness, which may explain the pattern of provider choice observed in the data. Since Shunyi county represents a relatively rich population in rural China, the results of this study may not be generalizable to the rest of China, especially areas of poverty. Future studies aimed at understanding health-seeking behaviour in poverty areas would provide important information for policy-makers.

Endnotes

[1] Data on visits to village health posts are not available from the *Chinese Yearbook of Health.*

[2] Among all visits to village level providers in the sample, only 7% were to solo private practitioners, and they are not distinguished from the village health posts in the analysis.

[3] In the entire sample of 8853 individuals, 46% were covered by CMS, 48% were on self-pay.

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Biographies

Winnie C Yip is Assistant Professor of International Health Policy and Economics at the Department of Population and International Health, Harvard School of Public Health, Boston. She obtained her PhD in economics from Massachusetts Institute of Technology in 1994.

Hong Wang is Associate Professor and Director at the Department of Health Economics at Beijing Medical University, Beijing. He obtained his MD at Beijing Medical University in 1986.

Yuanli Liu is a Research Associate at the Harvard School of Public Health, Boston. He obtained his PhD from the University of Minnesota in 1995.

Correspondence: Winnie C Yip, PhD, Rm 721, Holyoke Center, 1350 Massachusetts Avenue, Cambridge, MA 02138, USA.