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# HEALTH-SEEKING BEHAVIOR AND HOSPITAL CHOICE IN CHINA'S NEW COOPERATIVE MEDICAL SYSTEM

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SUMMARY

Since the dissolution of the Rural Cooperative Medical System at the end of the commune period, illness has emerged as a leading cause of poverty in rural China. To address the poor state of health care, the Chinese government unveiled the New Cooperative Medical System in 2002. Because local governments have been given significant control over program design, fundamental characteristics of the program vary from one county to the next. These differences may influence the decision to seek health care as well as the choice of hospital conditional on that initial decision. In this paper, we use a nested logit model to analyze household survey data from 25 counties to analyze the determinants of such health-seeking behavior. We find that age, the share of household expenditures allocated to food consumption (a measure of relative income), and the presence of other sick people in the household negatively affect the decision to seek health care while disability has a positive influence. Further, conditional on seeking treatment, the reimbursement scheme in place in each county and the average daily expenditure associated with hospitalization strongly influence hospital choice. Copyright © 2009 John Wiley & Sons, Ltd.

KEY WORDS: hospital choice; insurance; China; New Cooperative Medical System

## 1. INTRODUCTION

Poor households in developing countries are less able to afford health care and are often serviced with lower quality care than the nonpoor (World Bank, 1993). As a result, the poor are less likely to seek necessary treatment (e.g. Makinen *et al.*, 2000). At the same time, health shocks and poor health care are correlated with increases in poverty (e.g. Smith, 1999; Wagstaff, 2007) as those who seek care may incur medical debt while those who forego care lose productivity. China follows these trends. For example, 38% of rural people who were sick in 2003 did not seek treatment (Hsiao, 2005), and 22% of poor households in 1998 identified illness or injury as the cause of their poverty (Ministry of Health, 1999). Similarly, Gustafsson and Li (2003) find that high health care expenses caused 2.5% more households to drop below the poverty line in 1995.

The widespread lack of insurance in rural China is an important factor underlying these outcomes (Hsiao, 1995; Lindelow and Wagstaff, 2005). In particular, China's highly successful Rural Cooperative Medical System (RCMS) collapsed alongside communal farming in the early 1980s, leaving most farmers vulnerable. To address illness-led poverty and the poor state of health care in rural China more generally, the central government introduced a new insurance scheme in 2002. The New Cooperative Medical System (NCMS) is a voluntary program that protects participants against major illnesses by partially reimbursing health care expenditures. Although it is heavily subsidized by central, provincial, and sub-provincial governments, the program is administered at the county level, and local administrators have flexibility in its design and management. Consequently, there is heterogeneity in implementation, which may influence the decision to seek health care and where to seek it.

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The goal of this paper is to analyze how both variations in the design of the NCMS and household/individual characteristics of sick participants influence health-seeking behavior and hospital choice conditional on that decision. Previous research on whether health insurance affects the decision to seek treatment yields surprisingly mixed evidence. For example, people who held compulsory insurance in Vietnam are three times more likely to receive inpatient medical care than the uninsured, but admission rates of beneficiaries under a voluntary plan are similar to those of uninsured people (Sepehri *et al.*, 2006). The nature of health insurance also impacts utilization. For example, Yip *et al.* (2008) show that lower deductibles and immediate reimbursements result in higher use of outpatient care but do not impact inpatient care in rural China. Evidence is also mixed on how individuals who seek health care choose specific hospitals for treatment. For example, Adams *et al.* (1991) find that distance is a deterrent in the hospital choice of elderly Americans while Varkevisser and van der Geest (2007) find that Dutch patients prefer larger hospitals regardless of location. Next, while Adams *et al.* (1991) also observe that patients with severe illnesses prefer treatment in regional hospitals, Morey *et al.* (2003) find that the household income and treatment cost have stronger effects on hospital choice than the severity of illness or hospital quality in Nepal. They further find that sensitivity to costs and income is lower for men than women.

In this paper, we examine how variation in the design of county policies influence the choice of hospital by households. We further examine how these decisions differ among the poor and elderly, two vulnerable groups. Inasmuch as the quality of care varies by hospital type, the interaction between such NCMS policies on treatment decisions of enrollees can cause variation in actual health outcomes.

Following recent practice in the literature, we employ a full information maximum likelihood nested logit model with random utility maximization. We find that age, the share of household expenditures allocated to food consumption (a measure of relative income), and the presence of other sick people in the household negatively influence the decision to seek health care while disability has a positive impact. Moreover, conditional on treatment, the specific design of the NCMS program influences the hospital choice. In particular, as the reimbursement ceiling rises, households with more elderly members increasingly choose hospitals at higher administrative levels.

The remainder of the paper is organized as follows: Section 2 discusses the objectives and structure of the NCMS program; Section 3 describes the data and provides summary statistics; Section 4 outlines the multinomial nested logit model; Section 5 provides results; and Section 6 discusses these results.

## 2. THE NCMS PROGRAM AND HEALTH CARE IN CHINA

Rural health insurance was an integral part of the collective farming system in China, yet after the dissolution of communal farming, budget constraints forced many localities to abandon their insurance programs (Hsiao, 1984; Liu, 2004). Thus, 96% of rural households lacked health insurance by 2002 and 38% of the sick forwent necessary medical attention (Hsiao, 2005).

Rural health care returned to the national agenda with the introduction of the NCMS in 2002 (State Council, 2002). The NCMS has several important features that distinguish it from the previous programs. First, the NCMS operates on a voluntary basis. As such, the prospect for adverse selection is high. To address this concern, the central government has conditioned matching funding on local governments achieving 80% enrollment. Local governments have responded by visiting households to encourage enrollment by requiring whole households to enroll together, and/or by requiring that emigrants enroll with other household members despite sometimes being ineligible for NCMS reimbursement.[1]

[1]Hesketh *et al.* (2008) demonstrate that migrants have better self-reported health status and lower incidence of acute illness, chronic disease, and disability, even controlling for age and education, suggesting that they may be less likely to use the program as well.



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Second, although central and local governments underwrite the program, individuals pay participation fees. Each county sets its own fee, and some offer assistance or waive the fee for poor households (Wang and Rosenman, 2007). The central government has stipulated a minimum fee of 10 RMB per person, although many counties charge more. Participation fees are matched by at least 20 RMB from regional and/or sub-regional governments in poor counties, although the central government has mandated a 40 RMB match in wealthy areas. In addition, fees in poorer provinces are matched by an additional 20 RMB from the central government.[2] Total funding available for each participant averages 52 RMB (Nie, 2007).

Third, many aspects of the design, implementation, and management of the NCMS program are determined locally. Because the total pooled funds cover only 20–30% of per-capita medical spending (World Health Organization, 2004), county administrators face the challenge of reimbursing medical expenditures without exhausting their funding; with little direction from the state, individual counties have experimented with reimbursement systems. That is, each county decides reimbursement rates, whether to restrict coverage to specific ailments, and whether or not to limit eligibility to certain clinics and hospitals.[3] In practice, reimbursement rates vary by total expenditure, and many NCMS programs stipulate that a spending threshold be met before expenses become eligible for reimbursement. Ceilings on total reimbursement are also widespread. In addition, reimbursement rates often vary according to the administrative level of the hospital providing treatment.

Although participants are generally able to seek care in any hospital, many counties encourage local spending by lowering minimum spending levels or by offering higher reimbursement rates at local facilities (Wagstaff *et al*., 2009). While all NCMS programs cover inpatient medical care associated with catastrophic illnesses, only a subset of programs cover outpatient care, even for follow-up treatment (Wang *et al*., 2008). Further, while some counties cover accidents or inpatient child delivery, others do not. Yan *et al*. (2006) find that just 6% of hospital expenses were reimbursed in surveyed counties in 2004, suggesting that such cost-saving measures have been successful.

The NCMS has been implemented on a county-by-county basis since early 2003. The early adopters were not randomly chosen, but were selected based on local interest, managerial capacity, economic development level, and the quality of local facilities (Brown *et al*., 2009). Participation grew 67% between 2006 and 2007, yet participation rates within program counties have also risen. The proportion of NCMS participants that have actually benefited from the NCMS program has also seen a dramatic increase, doubling between 2005 and 2006 (Nie, 2007).

## 3. DATA AND SUMMARY STATISTICS

The data for this study come from surveys undertaken in October 2006.[4] The household sample consists of 50 households in each of 30 counties in Anhui and Jiangsu provinces in eastern China. The household survey included modules on demographics, health, health insurance, income, and expenditures over the previous year. A matching county-level survey was given to administrators overseeing the NCMS.

Of the 30 surveyed counties, 26 had established NCMS programs in place. In Anhui, 16 of the province's 105 county-level divisions had operated NCMS programs one or more years; all of these

[2]Prior to 2006, matches provided by the central and local governments were generally 10 RMB per participant.

[3]While financial considerations drive most of these decisions, the experience and training of county-level administrators varies widely, suggesting that some programs are likely to be better designed and more sustainable than others.

[4]The household-level data collection was undertaken by provincial offices of the National Bureau of Statistics in close collaboration with the Institute for Population and Labor Economics (IPLE) at the Chinese Academy of Social Science and Nanjing Agricultural University. The county-level survey was completed directly by researchers at IPLE. Data collection efforts were supported by the Ford Foundation Beijing Program Office.



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counties are included in our sample. All rural county-level districts in Jiangsu had implemented NCMS programs, so the ten counties in Jiangsu are drawn from a random sample stratified by income. One county in Jiangsu provided incomplete data on the fee structure of the NCMS, so our effective sample comprises 1250 households in 25 counties.[5]

An important limitation of our study is that we do not have a random sample of NCMS programs across China; as such, our results are statistically representative only of NCMS counties in Anhui and Jiangsu. Nevertheless, the issues that we raise reflect broadly on NCMS programs across China.

Brown *et al.* (2009) provide a detailed account of variation in the NCMS programs included in this survey. To summarize, the participation fee chosen by counties reflects county wealth: only one county in Anhui set the participation fee above the 10 RMB minimum established by the central government, while only two counties in Jiangsu adopted a 10 RMB fee (Table I). Furthermore, two very wealthy counties in Jiangsu have set fees of 30 RMB and 40 RMB, respectively. Most counties promote participation by reducing fees for 'five guarantee' (*wu bao*) and other poor households.

Differences in program fees stem from differences in financing across the two provinces. As a wealthy province, Jiangsu is ineligible for central government matching funds, so provincial, prefectural, county, and township governments compensate by contributing a greater share of the budget.[6] In Anhui, by contrast, the central government is responsible for at least 24% of the budget in all 16 counties, allowing local governments to reduce their contributions accordingly.

The budget influences decisions that each county makes regarding minimum spending levels eligible for reimbursement, maximum reimbursements, emigrant eligibility, and other aspects of program design.[7] For example, only 56% of the sampled counties in Anhui and 20% of the sampled counties in Jiangsu allow emigrants to participate, likely because health care costs are higher in cities that attract migrants (Eggleston and Yip, 2004). Reimbursement regimes for health expenditures also vary considerably, even across neighboring counties: the deductible ranges from 200 to 500 RMB in Anhui and from 0 to 1500 RMB in Jiangsu; the benefit ceiling ranges from 3000 to 40 000 RMB in Anhui and from 15 000 to 50 950 RMB in Jiangsu. Moreover, the administrative level of the hospital in which care is given influences these thresholds. For example, the median level of spending eligible for reimbursement is 200 RMB in township hospitals versus 300 RMB in other types of hospitals.

Table II shows the province-wide average daily health expenditures for inpatient care in both Anhui and Jiangsu. The province-wide daily average expenditure in a township-level facility is 222 RMB in Anhui versus 341 RMB in Jiangsu. The difference is more pronounced at the county level, with a daily average expenditure of 315 RMB in Anhui and 520 RMB in Jiangsu. At the prefectural/provincial level, however, the cost of care in Anhui is greater than that in Jiangsu, with average daily expenditures of 587 and 526 RMB, respectively.

Within the 25 counties included in our analysis, 89% of survey respondents have enrolled in the local NCMS program. With such high enrollment rates, bias due to selection into the program is unlikely to be problematic. Indeed, as shown in Table III, households that enroll in the program do not differ from those who do not enroll in terms of age structure, gender of the household head, the number of household members with disabilities or limitations in activities of daily living (ADLs), the number of household members who emigrate for work, the number of people who described themselves as being sick in the previous year, or income. That being said, heads of household who enroll in the program have 0.6 fewer years of education than heads of households who do not enroll, a difference that is significant at the 90% confidence level.

[5]All households were drawn from the National Bureau of Statistics sampling frame.
[6]In central and northern Jiangsu, where incomes and economic opportunities lag behind those found in wealthy southern communities such as Nanjing, Suzhou, and Wuxi, the provincial government heavily subsidizes the NCMS.
[7]Other characteristics that vary across the sampled counties include financing schemes, reimbursement rates at each level of hospital, coverage of non-chronic ailments, and hospital referral systems (Brown *et al.*, 2009).



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Table I. Variation in NCMS program design in sampled counties

| | | | | | | | | | Township hospitals | | | County hospitals | | | Prefectural hospitals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | County # | Fee (RMB) | Reduced fees | Central share (%) | Individual share (%) | Emigrants eligible | Non-chronic conditions covered | Outpatient services covered | Deduct. (RMB) | Max. reim. rate | Ceiling (RMB) | Deduct. (RMB) | Max. reim. rate | Ceiling (RMB) | Deduct. (RMB) | Max. reim. rate | Ceiling (RMB) |
| Anhui | 1 | 10 | X | 23.6 | 38.2 | | X | X | 200 | 60 | 15 000 | 400 | 50 | 15 000 | 500 | 40 | 15 000 |
| | 2 | 10 | X | 29.8 | 35.1 | X | X | | 200 | 50 | 3000 | 300 | 40 | 10 000 | 500 | 40 | 30 000 |
| | 3 | 10 | X | 27.8 | 36.1 | X | X | X | 400 | 70 | 30 000 | 400 | 60 | 30 000 | 400 | 50 | 30 000 |
| | 4 | 10 | X | 27.8 | 36.1 | | X | | 500 | 50 | 15 000 | 500 | 50 | 15 000 | 500 | 50 | 15 000 |
| | 5 | 10 | X | 39.3 | 26.3 | | X | X | 280 | 70 | 30 000 | 280 | 70 | 30 000 | 280 | 60 | 30 000 |
| | 6 | 15 | X | 30.6 | 37.4 | | X | X | 200 | 80 | 50 000 | 200 | 80 | 50 000 | 200 | 60 | 50 000 |
| | 7 | 10 | X | 27.7 | 36.1 | X | X | | 301 | 60 | 16 000 | 301 | 60 | 16 000 | 301 | 50 | 16 000 |
| | 8 | 10 | X | 29.0 | 19.0 | X | X | | 200 | 80 | 20 000 | 400 | 80 | 20 000 | 600 | 70 | 20 000 |
| | 9 | 10 | X | 33.3 | 33.3 | X | X | | 200 | 50 | 30 000 | 400 | 60 | 30 000 | 400 | 40 | 30 000 |
| | 10 | 10 | X | 27.7 | 36.1 | X | X | X | 300 | 80 | 40 000 | 300 | 70 | 40 000 | 300 | 60 | 40 000 |
| | 11 | 10 | X | 23.6 | 38.2 | | X | X | 200 | 50 | 30 000 | 200 | 50 | 30 000 | 200 | 30 | 30 000 |
| | 12 | 10 | X | 23.6 | 38.2 | X | X | | 200 | 45 | 10 000 | 300 | 50 | 10 000 | 400 | 50 | 10 000 |
| | 13 | 10 | X | 27.7 | 36.1 | | X | X | 200 | 65 | 10 000 | 400 | 75 | 10 000 | 500 | 50 | 10 000 |
| | 14 | 10 | X | 27.8 | 36.1 | X | | X | 301 | 70 | 40 000 | 301 | 70 | 40 000 | 301 | 60 | 40 000 |
| | 15 | 10 | X | 27.7 | 36.1 | | X | X | 300 | 70 | 17 510 | 300 | 60 | 14 140 | 300 | 50 | 11 170 |
| | 16 | 10 | X | 28.0 | 35.4 | X | X | | 300 | 70 | 10 000 | 400 | 60 | 10 000 | 500 | 50 | 10 000 |
| Jiangsu | 17 | 24 | X | 0.0 | 15.6 | X | | X | 0 | 58 | 15 000 | 0 | 58 | 15 000 | 0 | 58 | 20 000 |
| | 18 | 30 | X | 0.0 | 36.2 | | | X | 300 | 80 | 50 000 | 300 | 72 | 50 000 | 300 | 56 | 50 000 |
| | 19 | 40 | X | 0.0 | 33.3 | | | X | 500 | 65 | 50 000 | 500 | 65 | 50 000 | 500 | 60 | 50 000 |
| | 20 | 15 | | 0.0 | 45.9 | | | X | 1500 | 60 | 20 000 | 1500 | 60 | 20 000 | 1500 | 60 | 20 000 |
| | 21 | 12 | X | 0.0 | 28.6 | | X | X | 0 | 45 | 20 000 | 0 | 40 | 20 000 | 0 | 30 | 20 000 |
| | 22 | 10 | | 0.0 | 33.3 | X | X | X | 300 | 55 | 20 000 | 300 | 55 | 20 000 | 300 | 55 | 20 000 |
| | 23 | 10 | | 0.0 | 33.3 | | X | X | 0 | 50 | 15 000 | 0 | 50 | 15 000 | 500 | 50 | 15 000 |
| | 24 | 25 | | 0.0 | 51.1 | | X | X | 200 | 60 | 40 000 | 200 | 60 | 40 000 | 200 | 60 | 40 000 |
| | 25 | 25 | X | 0.0 | 62.1 | | | X | 0 | 60 | 50 950 | 0 | 60 | 50 950 | 0 | 60 | 50 950 |

*Notes*: 'Participation fee' is the premium associated with joining the NCMS program for each participant. 'Reduced fees' indicates that 'five guarantees' households pay lower participation fees. 'Central share' and 'Individual share' refer to the share of the program budget derived from the central government and individual participation fees in each county, respectively; the remainder of the budget comes from local governments. 'Emigrants eligible' indicates whether people who migrate out of the county are eligible to participate in the NCMS program. 'Non-chronic conditions covered' measures whether healthcare expenditures on accidents and other non-chronic ailments are eligible for coverage. 'Outpatient services covered' indicates whether the household offers coverage for outpatient services. 'Deduct.' refers to the minimum level of spending before expenditures become eligible for reimbursement at each level of hospital. 'Max. reim. Rate' refers to the maximum reimbursement rate for each type of hospital. 'Ceiling' identifies the maximum total benefit from participating. *Source*: Authors' survey data.





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Table II. Average daily expenditures on inpatient care in RMB, by province

| Hospital type: | Anhui | Jiangsu |
|---|---|---|
| Township | 222 | 341 |
| County | 315 | 520 |
| Prefecture/Province | 587 | 526 |
| Sample size | 321 | 132 |

*Source*: Authors' survey data.

Table III. Summary statistics for enrolled and non-enrolled households

| | | Enrolled households ($n = 1143$) | | Non-enrolled households ($n = 91$) | |
|---|---|---|---|---|---|
| Variable | Unit | Mean | Std. Dev. | Mean | Std. Dev. |
| Average age of members | Years | 36.4 | 0.316 | 36.4 | 1.035 |
| Male head of household | Percent | 95.9 | 0.006 | 95.6 | 0.022 |
| Members with disabilities or ADLs | Number | 0.027 | 0.003 | 0.029 | 0.011 |
| Members who migrate out for work | Number | 0.155 | 0.006 | 0.137 | 0.021 |
| Head of household's education | Years | 8.03 | 0.092 | 8.60* | 0.37 |
| Income | log RMB | 9.50 | 0.043 | 9.74 | 0.141 |
| Members who were sick in the last year | Number | 0.11 | 0.006 | 0.08 | 0.015 |

*Notes*: 'Enrolled' is defined as having enrolled in NCMS in the previous year. ***, **, and * indicate that the differences in means are statistically significant at the 99%, 95%, and 90% confidence levels using a *t*-test, respectively. *Source*: Authors' survey data.

Among the 4315 program participants in our survey, 442 (10%) either described their current health as 'worse' or 'much worse' than one year earlier or received inpatient treatment during the previous year.[8] Because we cannot observe which individuals were sick enough to require inpatient treatment, we use two different samples to analyze the determinants of health-seeking behavior and the choice of NCMS hospitals conditional on seeking care. Specifically, we initially restrict the sample to 442 'sick' individuals who either sought inpatient care or who can reasonably be expected to have needed it. As doing so may bias estimates upward by including all individuals who sought care without including individuals known to be as sick who did not seek care, we also estimate all of the models using the sample of 366 individuals who described their current health to be 'worse' or 'much worse' than before.

Summary statistics for the 442 sick NCMS participants and the non-sick sample of 3783 NCMS participants are presented in Table IV. The average age of sick people is 53, nearly 20 years older than people who were not. Women comprise 55% of the sick population but only 48% of the population that was not. The incidence of disability and/or limitations in ADLs is 13% among the sick, ten times higher than among the non-sick. Only 4% of the sick subsample emigrated compared with 17% of the non-sick. Household heads in the subsample with sick members have 0.8 fewer years of education, although this may reflect age differences in the two groups. Also likely related to age, people in the sick subsample are more likely to reside with other sick individuals. Finally, households with sick members allocate slightly more of their budget to food (52%) than households without sick members (50%).[9] Other than food shares, all of the differences are statistically significant at the 95% confidence level.

## 4. MODEL AND IDENTIFICATION

To model health care-seeking behavior among the sick, many studies employ multinomial or conditional logits. However, both models assume that errors are identically and independently distributed (iid) and

[8]Women whose only hospitalization in the previous year was for the purpose of inpatient child delivery are not included in this figure.
[9]The share of household expenditures allocated to food is based on the authors' survey data and includes home production.



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Table IV. Summary statistics for NCMS program participants

| | | Sick subsample ($n = 442$) | | | | Non-Sick subsample ($n = 3873$) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | Unit | Mean | Std. Dev. | Min | Max | Mean | Std. Dev. | Min | Max |
| Age | Years | 53.1 | 17.6 | 0 | 103 | 33.7*** | 17.5 | 0 | 89 |
| Male | Dummy | 0.446 | 0.498 | 0 | 1 | 0.521** | 0.500 | 0 | 1 |
| Disability or ADL limitations | Dummy | 0.133 | 0.340 | 0 | 1 | 0.012*** | 0.107 | 0 | 1 |
| Emigrant | Dummy | 0.041 | 0.198 | 0 | 1 | 0.165*** | 0.371 | 0 | 1 |
| Head of household's education | Years | 7.3 | 3.4 | 0 | 18 | 8.1*** | 3.1 | 0 | 19 |
| Food as a share of expenditures | Percent | 0.523 | 0.211 | 0.050 | 0.963 | 0.499** | 0.197 | 0.054 | 0.963 |
| Other sick household members | Dummy | 0.486 | 0.500 | 0 | 1 | 0.207*** | 0.405 | 0 | 1 |

*Notes*: 'Sick' is defined as having at least one condition that was treated on an inpatient basis in the previous year and/or reporting one's health to be 'worse' or 'much worse' than in the previous year. ***, **, and * indicate that the differences in means are statistically significant at the 99%, 95%, and 90% confidence levels using a *t*-test, respectively. *Source*: Authors' survey data.

that the independence of irrelevant alternatives (IIA) condition is satisfied. In the event that these assumptions are violated, multinomial and conditional logits yield inconsistent estimates (Amemiya 1985).

The nested logit model partially relaxes these assumptions while retaining the iid assumption within each partition, i.e. the error terms between two decisions are assumed to be uncorrelated, yet the errors within a given category may have non-zero correlations. In our model, we are concerned both with the decision to seek inpatient health care and, conditional on this decision, the choice of hospital. Such decisions are best illustrated by a tree structure with each decision represented by a distinct level/nest. The 442 individuals who participated in the NCMS program and who reported being sick comprise the trunk of the tree (Figure 1). Two limbs stem from the trunk – seek treatment in an NCMS facility and do not seek treatment in an NCMS facility[10] – forming the first nest of the tree. Conditional on seeking treatment, the second nest contains three branches indicating the administrative level of the hospital in which treatment was sought (i.e. township, county, or prefectural/provincial).[11] Importantly, the nested logit model does not imply any temporal ordering of choices.

The nested logit model reflects a choice framework such that individuals consider only the choice presenting the maximum utility for each decision. Suppose, for example, that an individual receives greater utility from treatment outside the county than from local hospitals. When deciding between seeking treatment and foregoing treatment, the only type of care that will influence the decision is that sought outside the county.

Following Heiss (2002), we employ a two-level decision tree with $K$ upper-level alternatives and $H$ lower-level alternatives, defining the utility function for individual $i$ as $U_{ih} = R_{ih} + \varepsilon_{ih}$, where $R_{ih} = \alpha_h + \beta_h x_{ih} + \gamma_h y_i$. $R_{ih}$, the deterministic portion of utility, is comprised of the alternative-specific variables, $x_{ih}$, and the case-specific variables, $y_i$. $\varepsilon_{ih}$ is the random portion of utility and $h \in H$. We further define the dissimilarity parameter as $\lambda_k = \sqrt{1 - \rho_k}$, where $\rho_k$ denotes the correlation within nest $k$, $k \in K$. In the event that $\lambda_k = 0$, the choices comprised in nest $k$ are perfectly correlated. If, instead, $\lambda_k = 1$, the alternatives are independent, i.e. the model reduces to a multinomial logit.

For the $k$th level of the tree, the inclusive value parameter represents the utility that an individual receives by consuming an alternative choice in this level of the tree. The inclusive value parameters are

[10]The decision 'Do not seek treatment in an NCMS facility' results in a degenerate branch for the second nest in the model. When estimating a model using RU2, the inclusive values are unidentifiable for the degenerate branch due to canceling in the dissimilarity parameters. While RU1 can be used to identify one of the dissimilarity parameters, it should be normalized to 1 (see Hensher *et al.*, 2005).

[11]Approximately 9.8% of the sample that was treated at an inpatient facility was treated more than once. In the event that an individual sought health care in more than one level of health care facility, we considered only the hospital at the highest administrative level. For example, if an individual received care in both township and county level hospitals, we considered the individual to have sought care at a county level hospital.



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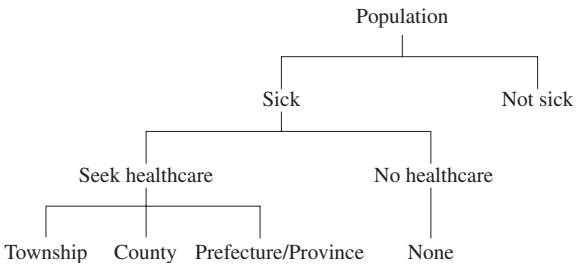


Figure 1. Tree structure reflecting healthcare choice

the main differentiation between two types of models used in nested logit estimation, the non-normalized nested logit model, and the random utility maximization model. In the non-normalized nested logit model, the inclusive value is defined as $IV_k = \ln \sum_{h \in D_k} \exp(R_{ihj})$, where $D_k$ is the set of alternatives in a choice level $k$ and $j$ describes the number of choices available in that limb. In the RUM model, $IV_k = \ln \sum_{h \in D_k} \exp(R_{ihj}/\lambda_k)$. In this case, utilities are comparable across levels since $R_{ih}$ is scaled within each level by the dissimilarity parameter. Contrarily, without rescaling, utilities may only be compared for alternatives within the same level.

We therefore use a RUM model in our analysis of a two-level nested logit model. We define $K = \{0, 1\}$ as indices for whether respondents seek care in an NCMS-eligible hospital, i.e. the limbs of the tree. Hospital choice ($H$) reflects whether sick participants seek care in hospitals at the township, county, or prefectural/provincial level or whether no NCMS-eligible care is sought.[12] We denote the top-level alternative (the choice of $K$) as $C_1$ and the bottom-level alternative (the choice of $H$) as $C_2$. The chosen alternative is that with the highest associated utility. Errors in the nested logit model are assumed to follow the generalized extreme-value distribution to allow for correlation between alternatives within the nest (Kotz and Nadarajah, 2000). The conditional distribution of the random disturbances ($\varepsilon_{kh}$) may thus be written as:

$$F_{H|K}(\varepsilon|k) = \left[ -\left\{ \sum_{h \in R_k} \exp(\varepsilon_{kh}/\lambda_k) \right\}^{\lambda_k} \right]$$

Following Amemiya (1985), we can derive the probability of choosing a particular administrative level, $h$, given the choice of seeking NCMS care, $k$, as:

$$\Pr(C_2 = j | C_1 = k) = \frac{\exp(x_{kh}\beta_j/\lambda_k)}{\sum_{m \in R_k} \exp(x_{hm}\beta_m/\lambda_k)}$$

There are two general normalization methods (Hensher *et al.*, 2005), one of which normalizes the scale parameters at the lowest level and one of which normalizes the scale parameters at the highest level. The latter is consistent with the utility theory (Silberhorn *et al.*, 2008), so our results use this method. Estimates are performed using Stata.

The dependent variable is an indicator reflecting four categories of hospital choice (township, county, prefecture/province, and none). The first-level alternative is estimated by seven case-specific explanatory variables: age and gender of the sick individual; a dummy indicating disability or limitations in performing ADLs;[13] a dummy indicating whether the sick individual emigrated in the previous year; the

[12]Six individuals who were sick and who had NCMS insurance sought treatment at hospitals that do not participate in the NCMS program, e.g. military hospitals. These observations are included in the 'no NCMS-eligible care' group, although the results are identical if two separate alternatives ('no care' and 'treatment in other hospitals') are identified separately. Results are qualitatively the same if treatment in other hospitals stands alone in its own branch and if a three-level model is instead used. We therefore choose to use the two-level model with two limbs and three branches for expositional simplicity.



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head of household's education; the share of expenditures allocated to food consumption; a dummy indicating whether the household includes other members who are also sick; a dummy for whether non-chronic conditions are eligible for reimbursement under the NCMS program; and a dummy indicating whether outpatient treatment is covered by the program. Age, sex, disabilities, and emigration status are individual-level descriptors that likely influence both the decision to seek care and hospital choice. For example, Gao and Yao (2006) show that women are more likely to seek care than men. Similarly, Reinhardt (2000) shows that age and disability positively influence both health care consumption and total spending thereon. By contrast, people who emigrate have better self-reported health status (Hesketh *et al*., 2008). The education level of the household head proxies for knowledge of health, as education has been shown to positively correlate with health care utilization (e.g. Ichoku and Leibbrandt, 2003; Lindelow, 2004). The share of household expenditures allocated to food is included to proxy for household budget constraints[14] as, for example, Makinen *et al*. (2000) show that relative income influences both the decision to seek care and the type of care sought. Next, resource-constrained households with multiple sick members face decisions regarding which household member to treat through inpatient care. Coverage of non-chronic conditions will likely increase demand for inpatient services while coverage of outpatient services will likely decrease it.

Four alternative-specific variables model the second level of the tree. All models include the deductible, the logged benefit ceiling, and the average daily expenditures of inpatient care (for which we use both provincial and county averages). In some specifications, we also include a measure of average travel costs to each type of hospital. Data pertaining to deductibles and ceilings are provided by NCMS administrators, while those for average daily expenditures and travel costs are generated from the household data. Each of these alternative-specific variables varies by the administrative level of hospital chosen for treatment.[15]

Finally, to understand whether or not poor or elderly households are affected differently, we interact the alternative-specific variables with indicator variables in some specifications. Specifically, to measure whether poor households respond differently than non-poor households, we use a dummy indicating that household income falls below the official poverty line of 680 RMB per capita. To measure whether the elderly respond differently, we use the share of elderly in the household as the interaction term.

## 5. RESULTS

Results for the two-level nested logit model of health care choice are shown in Tables V and VI. The results are separated into two nests based on the decision tree, with the top nest reflecting the decision to seek health care from an NCMS-eligible provider and the bottom nest reflecting the choice of hospital. Errors are clustered by county and *p*-values are shown.

Although the results in the top nest are subjected to aforementioned sample selection bias, they are largely consistent across the two samples and with the literature. For example, similar to Reinhardt (2000), we find that younger individuals are less likely to seek care. We do not find a significant effect for

[13]ADLs measured in the survey include walking, standing upright for extended periods, lifting heavy objects, bathing, toileting, and dressing one's self. These and other ADLs have been shown to reflect general health conditions (McDowell and Newell, 1996).

[14]See, for example, Ravallion (1993) for some caveats about this indicator. We also tried using the log of household expenditures and the log and level of housing wealth as self-reported by the household. Although not reported here, the inclusion of these variables yielded qualitatively similar results.

[15]We thank an anonymous referee for observing that such variables may be used to model the decision to seek health care in a traditional selection model. However, because these variables vary by hospital choice, they belong at the alternative-specific level in the nested logit model, as explained by Hensher *et al*. (2005): 'We should always place the attributes that are unique in a level for an elemental alternative [i.e. hospital type] with the elemental alternative and not with the composite alternative [i.e. the decision to seek health care].' As noted above, however, because the nested logit model does not imply any temporal ordering of choices, the alternative-specific variables also influence the decision to seek health care.



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Table V. Determinants of health-seeking behavior and hospital choice, estimated with nested logit model

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| *Case specific variables* | | | | | |
| Age | 0.86 | 0.86 | 0.86 | 0.86 | 0.86 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Age-squared | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Male | 1.40 | 1.41 | 1.40 | 1.40 | 1.38 |
| | (0.18) | (0.18) | (0.18) | (0.17) | (0.22) |
| Disability or ADL limitations | 2.86 | 2.77 | 2.86 | 2.84 | 2.83 |
| | (0.00) | (0.01) | (0.00) | (0.01) | (0.00) |
| Emigrant | 0.44 | 0.46 | 0.45 | 0.46 | 0.47 |
| | (0.14) | (0.14) | (0.15) | (0.14) | (0.16) |
| Head of household's education | 0.98 | 0.97 | 0.98 | 0.98 | 0.98 |
| | (0.34) | (0.30) | (0.34) | (0.32) | (0.41) |
| Food as a share of expenditures | 0.31 | 0.35 | 0.32 | 0.28 | 0.31 |
| | (0.03) | (0.06) | (0.03) | (0.02) | (0.03) |
| Other sick household members | 0.30 | 0.32 | 0.31 | 0.31 | 0.30 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Non-chronic conditions covered | 0.99 | 1.10 | 1.00 | 0.99 | 1.01 |
| | (0.98) | (0.68) | (1.00) | (0.95) | (0.98) |
| Outpatient services covered | 0.75 | 0.66 | 0.73 | 0.75 | 0.72 |
| | (0.30) | (0.16) | (0.19) | (0.30) | (0.18) |
| *Alternative-specific variables* | | | | | |
| Reimbursement deductible (in thousands) | 0.45 | 0.50 | 0.46 | 0.52 | 0.54 |
| | (0.02) | (0.07) | (0.05) | (0.06) | (0.15) |
| Log of reimbursement ceiling | 1.46 | 1.41 | 1.47 | 1.48 | 1.42 |
| | (0.00) | (0.01) | (0.00) | (0.00) | (0.00) |
| *Average daily health expenditures* | | | | | |
| on inpatient care (in hundreds) | 0.61 | 0.88 | 0.64 | 0.58 | 0.77 |
| | (0.05) | (0.09) | (0.17) | (0.10) | (0.34) |
| Average travel cost (in hundreds) | | | 0.97 | 0.99 | 0.97 |
| | | | (0.80) | (0.96) | (0.77) |
| Interaction with deductible | | | | 0.01 | 0.62 |
| | | | | (0.34) | (0.83) |
| Interaction with ceiling | | | | 0.89 | 2.04 |
| | | | | (0.70) | (0.08) |
| Interaction with average expenditures | | | | 2.14 | 0.17 |
| | | | | (0.25) | (0.16) |
| Interaction with travel cost | | | | 0.83 | 0.56 |
| | | | | (0.37) | (0.41) |
| Type of Expenditures | Province | County | Province | Province | Province |
| Interaction Term | | | | Poverty | Elderly |
| Number of Obs. | 446 | 446 | 446 | 446 | 446 |

*Notes*: Coefficients are reported as odds-ratios and *p*-values are shown in parentheses. Columns (1) and (3)–(5) use average provincial expenditures as the health expenditures variable and column (2) uses average county expenditures. In column (4), interactions are with an indicator variable that household income was below the official poverty line. In column (5), interactions are with a variable measuring the share of the elderly in the household.

gender, a result that is consistent with Yip *et al*. (1998). Next, having a disability or limitations in ADLs positively impacts the probability that health care is sought at the 99% confidence level. Finally, the sign on the emigrant dummy follows our *a priori* assumption that emigrants are less likely to seek NCMS care given limited coverage outside the county, although the *p*-value on this coefficient is approximately 0.15 in Table V and between 0.21 and 0.45 in Table VI.[16]

[16]Inasmuch as the sick are less likely to migrate for work, this variable may be subject to simultaneity bias. As such, the effect would be difficult to interpret even if the point estimate was statistically significant.



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Table VI. Determinants of health-seeking behavior and hospital choice using the nested logit model, restricted sample

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Case specific variables* | | | | |
| Age | 0.92 | 0.92 | 0.90 | 0.92 |
| | (0.03) | (0.02) | (0.00) | (0.04) |
| Age-squared | 1.00 | 1.00 | 1.00 | 1.00 |
| | (0.05) | (0.04) | (0.01) | (0.10) |
| Male | 1.42 | 1.42 | 1.42 | 1.37 |
| | (0.24) | (0.25) | (0.26) | (0.32) |
| Disability or ADL limitations | 5.10 | 5.16 | 5.05 | 5.19 |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| Emigrant | 0.51 | 0.48 | 0.40 | 0.48 |
| | (0.45) | (0.40) | (0.21) | (0.38) |
| Head of household's education | 0.93 | 0.93 | 0.92 | 0.93 |
| | (0.08) | (0.09) | (0.06) | (0.09) |
| Food as a share of expenditures | 0.48 | 0.44 | 0.38 | 0.44 |
| | (0.26) | (0.21) | (0.12) | (0.25) |
| Other sick household members | 0.24 | 0.23 | 0.22 | 0.22 |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| Non-chronic conditions covered | 0.98 | 0.99 | 0.94 | 1.00 |
| | (0.95) | (0.97) | (0.87) | (1.00) |
| Outpatient services covered | 0.58 | 0.62 | 0.62 | 0.61 |
| | (0.16) | (0.24) | (0.29) | (0.24) |
| *Alternative-specific variables* | | | | |
| Reimbursement deductible (in thousands) | 0.01 | $<0.01$ | 0.01 | 0.0024 |
| | (0.01) | (0.00) | (0.00) | (0.00) |
| Log of reimbursement ceiling | 1.30 | 1.29 | 1.37 | 1.28 |
| | (0.23) | (0.26) | (0.17) | (0.33) |
| Average daily health expenditures on inpatient care (in hundreds) | 0.28 | 0.24 | 0.21 | 0.25 |
| | (0.03) | (0.01) | (0.00) | (0.04) |
| Average travel cost (in hundreds) | | 1.19 | 1.27 | 1.23 |
| | | (0.28) | (0.14) | (0.32) |
| Interaction with deductible | | | 0.01 | 357.27 |
| | | | (0.39) | (0.11) |
| Interaction with ceiling | | | 0.49 | 1.18 |
| | | | (0.53) | (0.89) |
| Interaction with average expenditures | | | 13.95 | 0.51 |
| | | | (0.33) | (0.84) |
| Interaction with travel cost | | | 0.21 | 0.75 |
| | | | (0.15) | (0.84) |
| Interaction term | | | Poverty | Elderly |
| Number of obs. | 366 | 366 | 366 | 366 |

*Notes*: Coefficients are reported as odds-ratios and *p*-values are shown in parentheses. All columns use provincial average expenditures as the expenditures variable. In column (3), interactions are with an indicator variable that household income was below the official poverty line. In column (4), interactions are with a variable measuring the share of the elderly in the household.

Household-level case-specific variables are also reasonably consistent with the expectations. First, we do not find that the household head's education level has a significant relationship with health-seeking behavior, consistent with Gertler and van der Gaag (1990) but not Lindelow (2004). Perhaps not surprisingly, the share of expenditures allocated to food has a negative and significant relationship with the decision to seek in-patient care, consistent with the findings of Makinen *et al.* (2000). Clearly, as more of the budget is allocated to food, less money is available to spend on hospitalization, with or without the NCMS. The presence of another sick household member also reduces the odds that an individual seeks health care. Finally, although the coverage of outpatient services has an interesting negative odds ratio, neither that nor coverage of non-chronic conditions is significant even at the 10 percent level.



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The results in the bottom nest are perhaps more interesting for policy as they determine where people seek health care conditional on seeking treatment. We find that the deductible has a consistently negative effect. Thus, as the deductible for hospitals at a given administrative level increases, individuals shy away from seeking health care in those facilities. The logged reimbursement ceiling has an odds ratio of between 1.28 and 1.48, significant in Table V, but not in Table VI, implying that as the ceiling increases for hospitals of a given type, individuals are more likely to seek care in those hospitals. Third, we estimate an odds ratio below one on daily expenditure on inpatient care, whether it is measured as the provincial average or the county average. Thus, as hospitals at a given administrative level become more expensive in relative terms, people seek other sources of health care. Finally, we find that the travel cost has a slightly negative effect in Table V and a positive effect in Table VI, but neither coefficient is precisely estimated (it remains in the model as a control variable). By and large, these findings demonstrate that individuals seek to minimize health expenditures in health-seeking behavior.

We further interact the four alternative-specific variables with a poverty indicator (Table V, column 4 and Table VI, column 3) and the share of elderly in the household (Table V, column 5 and Table VI, column 4). Given the limited number of degrees of freedom in this estimator, it is not surprising that noise increases as we add regressors. Thus, although many of the point estimates on these interactions are not statistically significant, they still suggest interesting differences in the calculus of poor and elderly households in deciding where to seek care. For example, the poor are less likely than the non-poor to respond to differences in expected expenditures, suggesting perhaps that they forego care until their conditions become severe enough to require treatment in expensive facilities. The elderly, on the other hand, appear to be less likely to respond to differences in average expenditures. Instead, they seem more likely to respond to the ceiling: households with a larger share of elderly residents are significantly more likely than others to use hospitals with higher reimbursement ceilings. This result is not unexpected if the elderly have illnesses that are more costly to treat.

### 5.1. Post-estimation analysis

Using the estimates presented in column 1 of Table V, Figure 2 displays the predicted probability of choosing each outcome holding all variables constant at their means. The predicted probability of foregoing hospital care altogether is 71.3%. Conditional on seeking treatment, the probability of choosing a township hospital is 38.9%, the probability of choosing a county hospital is 34.2%, and the probability of choosing a prefectural/provincial hospital is 26.9%.

Figure 3 shows the relationship between age and the predicted probabilities of selecting each type of health care. To generate these predictions, age is simulated to rise in 5-year increments while other

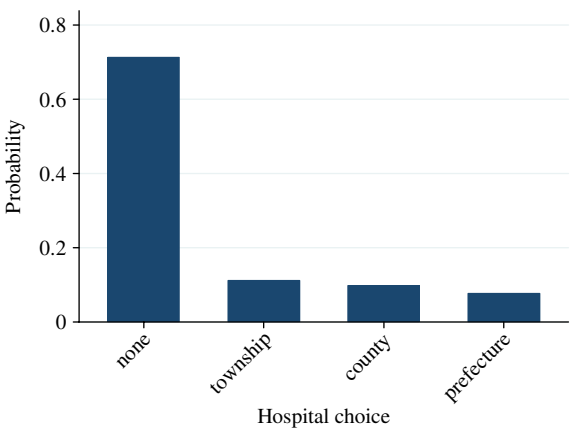


Figure 2. Predicted probability of each hospital choice



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variables reflect their empirical distributions. The figure clearly demonstrates that the probability of selecting health care of any type falls as age rises. Indeed, the probability of seeking health care falls below 50% after age 45 and drops below 10% around age 70. Likewise, Figure 4 illustrates the changes in the predicted probabilities of seeking health care in each type of facility as the share of expenditures allocated to food consumption varies: the predicted probability of seeking health care of any type falls from 37 to 22% as the simulated value rises from 5 to 95%.

In Figure 5, the deductible is simulated as a share of the empirical level for each hospital type by county, ranging from 25 to 200%. A 75% reduction in the minimum spending level eligible for reimbursement causes the predicted probability of seeking inpatient treatment to rise by just 2.8 percentage points. A doubling of the minimum spending level reduces the probability of seeking health care by 3.4 percentage points. Similarly, in Figure 6, predicted probabilities of choosing each type of health care calculated as the reimbursement ceiling varies from 25 to 200% of the empirical value for each hospital type.[17] A 75% reduction in the maximum benefit available causes the predicted

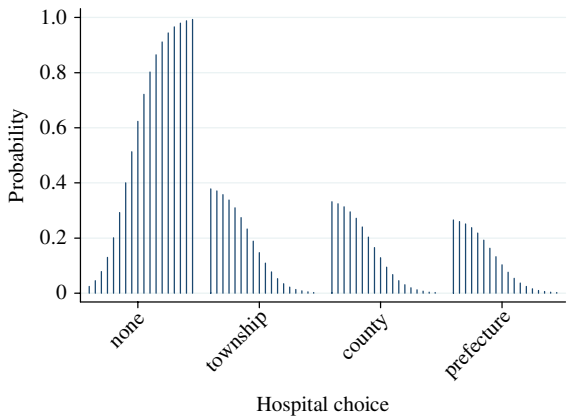


Figure 3. Predicted probability of each hospital choice, by age. *Notes*: Each bar represents the predicted probability of choosing each hospital type by age, where age is simulated in 5-year increments, beginning at age 10. Other variables remain at their empirical distributions

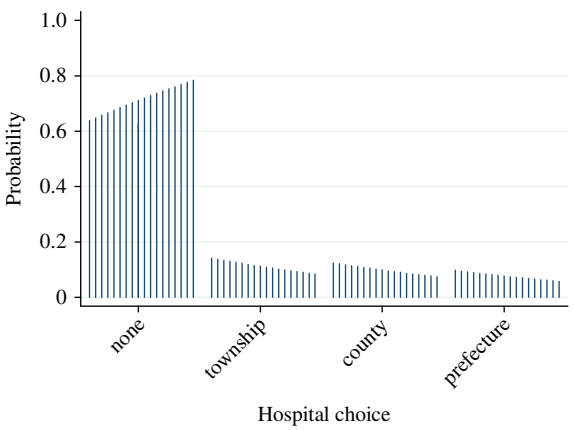


Figure 4. Predicted probability of each hospital choice, by poverty level. *Notes*: Each bar represents the predicted probability of choosing each hospital type by the share of total expenditures allocated to food, where the share is simulated in 5 percentage point increments, beginning at 5%. Other variables remain at their empirical distributions



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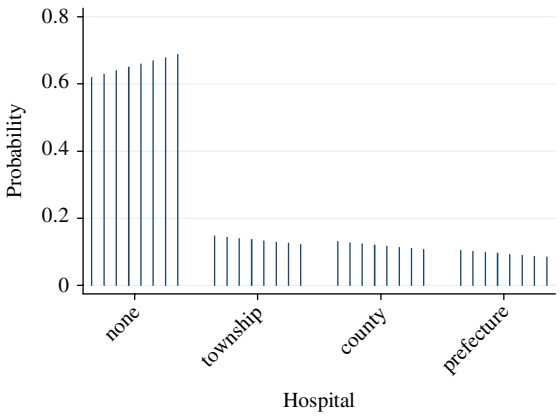


Figure 5. Predicted probability of each hospital choice, by minimum spending level eligible for reimbursement. *Notes*: Each bar represents the predicted probability of choosing each hospital type by the minimum spending level eligible for reimbursement. The minimum spending level is simulated as a share of the existing level for each hospital type in each county, increasing in 25 percentage point increments, beginning at 25% of the true levels. The thick line represents the empirical minimum spending level. Other variables remain at their empirical distributions

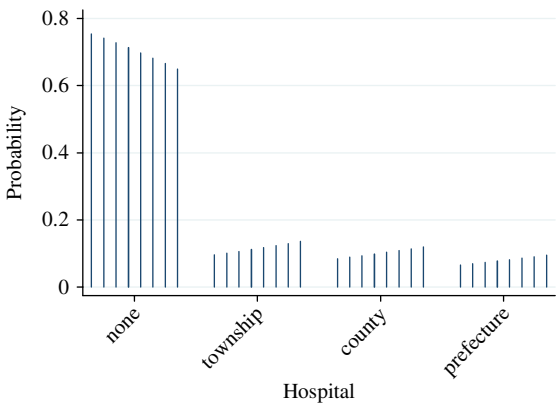


Figure 6. Predicted probability of each hospital choice, by maximum total benefit. *Notes*: Each bar represents the predicted probability of choosing each hospital type by the maximum total reimbursement. The maximum reimbursement is simulated as a share of the existing level for each hospital type in each county, increasing in 25 percentage point increments, beginning at 25% of the true levels. The thick line represents the empirical maximum total reimbursement. Other variables remain at their empirical distributions

probability of seeking inpatient treatment to decline by 4.2 percentage points, while doubling the maximum benefit increases the probability of seeking health care by 6.3 percentage points.

Finally, we calculate price elasticities at the sample means for the two consistently significant hospital choice variables (i.e. the deductible and the average provincial expenditures) by simulating price changes at one level relative to the others (Table VII). In general, demand for inpatient care is fairly inelastic to changes in the deductible, but it is quite elastic in responding to changes in average expenditures. This effect is nonlinear, with the price elasticity varying by price level. For example, in response to a 10% increase in the average expenditures at the prefecture level, the expected response is a 25% decrease in

[17]Although the maximum total benefit is defined in log form in the nested logit regression, it is linearized here to facilitate comparison with the minimum spending level.



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Table VII. Selected own-price and cross-price elasticities, nested logit model

| Elasticities | with respect to… | | |
|---|---|---|---|
| *Deductible* | | | |
| | Township | County | Prefecture |
| Township hospital | −0.192 | 0.017 | 0.005 |
| County hospital | 0.012 | −0.233 | 0.007 |
| Prefecture hospital | 0.013 | 0.022 | −0.258 |
| *Average daily expenditures* | | | |
| Township hospital | −1.043 | 0.092 | 0.029 |
| County hospital | 0.079 | −1.519 | 0.045 |
| Prefecture hospital | 0.124 | 0.218 | −2.520 |

*Note*: Elasticities are calculated using the coefficient estimates in column 3 of Table V.

demand for care at the prefectural level. As the corresponding cross-price elasticities are quite low, more people would hypothetically forego care with such changes. From a policy perspective, lowering the average expected expenditures for in-patient care would seem to increase the demand for health care.

## 6. DISCUSSION

NCMS participants who reveal themselves to be in deteriorating health tend to forego health care in an NCMS-eligible facility. Given the high minimum spending levels for reimbursement and the low maximum benefits available in some counties, the low incidence of seeking care in NCMS hospitals may not be unexpected. Still, this low take-up rate yields questions about how well the current policy structure achieves the goals of the NCMS. That is, with reimbursement rates topping out between 30 and 45% in some counties, coverage may be inadequate to induce rural people to seek care. Indeed, Brown *et al*. (2009) show that out-of-pocket expenses exceed 50% of total expenditures for catastrophic health costs of 25 000 RMB in over half of the counties included in their sample. Consistent with this story, we find that households that allocate more of their consumption to food are less likely to seek health care: a 5 percentage point simulated increase in this measure reduces the probability that a sick individual obtains health care in NCMS hospitals by 1 percentage point. Perhaps as a result of these low reimbursement rates and high out-of-pocket costs, many individuals treat illness through traditional medicine, which accounts for as much as 40% of all health care delivered in China (WHO, 2004).

Both higher age and sickness among other household members reduce health-seeking behavior. One possible explanation is that costs incurred by elderly and/or sick household members (e.g. over-the-counter medicines) crowd out expenditures on hospitalization. A second possibility is that households near subsistence consumption may allocate scarce resources according to each household member's expected productivity. That is, if some minimum threshold for health care spending must be met to ensure survival, then if income is insufficient to meet the health care needs of all household members, spreading resources equally across household members endangers the entire household. Under such circumstances, discrimination against less productive household members may help the entire household to survive. Since the elderly are likely to have the lowest expected value of future income, they may consume less health care.[18] A third possibility is that the elderly people willingly forego health care consumption to facilitate greater investment in the health and human capital of other household members. Such altruism, particularly for the benefit of children, is consistent with evidence provided by Silverstein *et al*. (2007). Our survey data do not allow us to differentiate between these explanations, leaving this topic an important issue for future survey research.

[18]Dasgupta and Ray (1986) describe the phenomenon of optimal discrimination in the context of nutrition.



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Next, conditional on seeking health care in an NCMS-eligible facility, patients generally choose township hospitals: the predicted probability of being treated in a township hospital is 45% larger than being treated in a prefectural/provincial hospital. Given that the rural Chinese widely perceive hospitals at higher administrative levels to offer higher quality services (Eggleston *et al*., 2008), individuals may prioritize price over quality in choosing facilities consistent with the empirical evidence provided by Hotchkiss (1998). In fact, program administrators in some counties have encouraged this response by setting lower minimum spending levels and/or higher maximum reimbursements in local facilities (Wagstaff and Lindelow, 2008). Such reimbursement policies may also be an attempt to encourage individuals to seek care at lower-level facilities for minor health incidents rather than tying up resources at higher-level hospitals. Alternatively, patients may choose township hospitals for convenience or because of preference for local doctors. Again, this topic remains for future research.

Although the cross-sectional data employed in this analysis preclude a rigorous evaluation of how all vulnerable groups fare under the NCMS program, our results suggest that the poor and elderly are less likely to seek health care when sick despite having identical insurance to other rural people living in their county. Inasmuch as the policy goals of the NCMS program are to reduce the effect of health shocks for vulnerable people, its implementation and structure to date leave much to be desired.

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## CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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