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UPDATED HORIZONTAL INEQUITY IN HEALTH CARE UTILIZATION IN JAPAN: COMPARISONS WITH OECD COUNTRIES USING AN ORIGINAL SURVEY

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Abstract

We compare health care inequity in Japan with that in other OECD countries in 2002 and 2003. To overcome Japanese data problems, we conducted an original survey. Although some problems remain, we obtained internationally comparable results on health care inequity for Japan. We test the utilization measure by the number of outpatients, the number of days of inpatient utilization in the previous year, out-of-pocket payments in the previous year and other measures, such as a yes/no indicator for outpatient or inpatient utilization in a lifetime. The results show that there is no inequity in outpatient or inpatient utilization, but out-of-pocket payments show significant pro-rich inequity.

Keywords: Horizontal Inequity, Japan, International Comparisons, Concentration Index, Kakwani Index, Needs

1 Introduction

Inequity in health care has recently become one of the most pertinent and relevant issues in health economics and health policy. Much research on methodology and international comparisons has been carried out by Wagstaff et al. (1989, 1991), Van Doorslaer and Wagstaff (1992), Wagstaff and Van Doorslaer (1993, 1994), Van Doorslaer et al. (1997, 2000), and Kakwani et al. (1997). In particular, research on horizontal inequity has been undertaken by Van Doorslaer et al. (2000) and, most recently, by Wagstaff and Van Doorslaer (2000).

Eleven OECD countries have been studied on the basis of reasonably comparable definitions of health inequity. Unfortunately, Japan has not been included in previous studies. While Ohkusa and Honda (2003a) use the Comprehensive Survey of Living Conditions for Japan (CSLC), this survey only reports whether individuals are currently visiting a doctor, rather than the frequency of visits to a doctor or hospitalization during the previous year, as surveys for other OECD countries do. Unfortunately, no national survey contains both this information and other socio-demographic information. Hence, an original survey is needed. Mainly due to financial limitations, the sample size of our original survey was far less than that of a national survey. However, it may still be representative even though it uses two-stage strata, as does the CSLC. Our survey supplements the CSLC and is comparable with those for other countries.

We performed the survey in March of 2002 and 2003, and we obtained about 3,000 observations. There were various reasons why we could not complete the survey in one phase. The most important reason was financial difficulty. We had funds to survey about 1,500 individuals in one year but it was insufficient to survey 3,000 individuals. Fortunately, the funding was available in the succeeding year and thus we could survey over two years. The second reason was related to some concerns about bias due to the small sample. Of course, we analyzed the 2002 data of our original survey (Ohkusa and Honda 2003b), but some problems seemed to remain, which might have been due to the small sample or other survey procedures. To overcome the small sample or other problems, we needed a more appropriate survey once again. The third reason concerns the definition of variables that indicate inpatient utilization. In the 2002 survey, we had surveyed only inpatient utilization in a lifetime until the year of the survey or within a year. However, in other OECD countries, the number of hospitalized days is also surveyed and analyzed. Hence, we added some questions about hospitalized days in the 2003 survey.

Before considering the measurement of health care, the institutional background in Japan is summarized. In 1961, Japan completed the introduction of compulsory public health insurance with coverage for all residents. In 1997, a new law was introduced requiring coinsurance rates of 20% for the employed and 30% for others, such as the self-employed and dependents. For people over 70 years of age, out-of-pocket payments (OPP) are limited to approximately 4000 yen (about US$36 in 2001 prices) per month. However, large firms sometimes subsidize their employees by reducing their co-payments to less than the legal requirement. Medical services are provided as welfare to very poor people who cannot afford to pay the premiums. Thus, everybody can access medical services in Japan.

The public health insurance system provides reimbursement on a fee-for-service (FFS) basis. Although the government regulates the price of treatment and drugs almost every year, it cannot directly control the choice of treatment and/or drugs, unlike the Utilization Review at Managed Care. Unlike the National Health Service (NHS) and Sickness Fund, the insurer cannot control the budget ex ante.

There is no regulation of the medical services chosen by patients, as undertaken by the gatekeeper in the NHS, or different coverage as in the HMO. In other words, there is no practical difference between general practitioners and specialists. The coinsurance rate is the same for services provided in hospitals and clinics (either public or private), but congestion may implicitly impose an opportunity cost. The number of beds is strictly regulated, but provision of outpatient services is virtually unregulated.

Private insurance plays only a minor role because public insurance has such a comprehensive coverage of medical services. Shigeno (2000) shows that private insurance appears to complement public insurance only through its income effect. Hence, private insurance in Japan is very different from that in the USA and European countries, which is why Japan is usually excluded from international comparisons in health economics.

2 Data

Our original survey was conducted in March of 2002 and 2003 for the whole of Japan. In 2002, 640 questionnaires were distributed and 570 were completed and returned, which provided information on about 1,450 adults. In 2003, the corresponding figures were 900, 783 and 1,596 respectively.

These households voluntarily contracted with the firm that conducted the survey to complete the various surveys. The households surveyed were randomly sampled by two-stage strata, but decisions to cooperate were deliberate. Therefore, particular attention should be paid to the sampling bias that can arise from this type of sampling. In fact, the survey has no unemployed and few self-employed respondents, and there is a slight bias towards richer households. However, this bias could be controlled for by appropriately weighting information. Hence, not only are subsequent regression results weighted by income and by region, so are the summary statistics. The sample excludes institutionalized individuals.

Unfortunately, even after combining the two years, our sample of 3,046 respondents is the smallest used for a health care inequity study for any OECD country. The second smallest is a sample of 3,374 respondents for Sweden used by Van Doorslaer et al. (2000). Other countries for which sample sizes of less than 4,000 have been used are East Germany (3,844) and Denmark (3,955). These were conducted in the early 1990s and so could be updated. Although comparable, our data set for Japan is much smaller than the surveys for other OECD countries. This is due primarily to financial problems, which cannot be fixed in the short term. Therefore, we have to use our small data set to analyze health care inequity in Japan, even though smaller samples may lead to bias.

The basic framework of the surveys conducted in the two years are almost identical. However there are some differences in sampling and in the questionnaire. First, in the 2002 survey, we selected a few prefectures to survey. By comparison, in 2003, the survey was distributed randomly to the whole of Japan. Second, the categories of income and OPP are finer in the 2003 survey than in the 2002 survey; in the first year, there were nine and aright categories in income and OPP respectively, while in the second year this was changed to 23 and 22 categories respectively. This change may improve the preciseness of income and OPP, and thus contribute to gaining a more reliable estimator. The third point concerns days of hospitalization, i.e. the 2002 survey did not ask about this issue, but the 2003 survey did. Since it is used in OECD studies other than Japan, this improvement can contribute to be more convenient comparison between Japan and other OECD countries.

The main variables are defined as follows. Outpatient utilization is defined in two ways. The first indicator of outpatient utilization is whether an individual visited a doctor in the previous year, while the second definition uses the number of visits. Although the latter is used in international comparisons, the former is similar and has been used previously (see, e.g., Ohkusa and Honda, 2003a). Note again that there is no practical difference between general practitioners and specialists.

Inpatient utilization is defined in a similar way to outpatient utilization, but we set two reference periods, i.e. utilization in the previous year, which is used in OECD studies, and utilization in the lifetime until the survey year. Based on these reference periods, the first indicator of inpatient utilization is whether an individual was hospitalized in the reference period and the second definition uses the number of hospitalized days. Hence, we use four types of inpatients utilization. Hereafter, the difference between reference periods is indicated by a superscript, i.e. "Inpatient^a" indicates utilization of inpatient service when the reference duration is the previous year and "Inpatient^b" indicates utilization of inpatient services when the reference duration is the lifetime until the survey year.

OPP is defined at the household level. Note that because the questionnaire defines OPP as payment for medication, it is not limited to co-payments for medical services, but also includes non-prescribed drugs and other medical services that are not covered by public health insurance. Thus, we assume that its mode in each category is the number. Since the highest category is open-ended, we use the same interval as in the second highest category. Income is also measured at the household level in nine categories. Hence, we make the same adjustment as for OPP. Moreover, income is adjusted to household structure as follows.

$$\text{Adjusted Income} = \frac{\text{Income}}{(\text{Number of Adults} + 0.5 \text{ Number of Children})^{0.75}} \qquad (1)$$

where children are less than 16 years old. Chronic disease is represented by a dummy variable that indicates whether individuals suffered from symptoms even if they were not currently visiting a doctor.

Summary statistics are shown in Table 1. In the previous year, 74% of individuals visited a doctor and the average number of visits was 10.4, i.e., almost once a month. On the other hand, about 5.7% of individuals were hospitalized in the previous year, but about half of the individuals were hospitalized in their lifetime until the survey year. The hospitalized days reflect such a difference, i.e. the number of hospitalized days in the lifetime is about ten times larger than hospitalized days in the previous year. Average OPP per year per capita is about 60 thousand yen (about $50). Per capita income adjusted for the number of adults in the household is about 3.2 million-yen (about US$25,000).

3 The Measurement of Horizontal Inequity

In measuring horizontal inequity, three aspects need to be clarified: the definition of demand for medical care; the definition of needs; and the estimation methods. The definitions and estimation methods used in this paper are described below. Social and economic conditions are defined individually by household disposable income per equivalent adult, as in previous studies.

3.1 Definition of Needs

Concerning the definition of needs, existing studies use incidences of chronic illness (Van Doorslaer and Wagstaff, 1992) and self-assessment of health (Van Doorslaer et al., 1997). Conversely, Van Doorslaer and Wagstaff (2000) define needs as the estimated demand for medical care, which is explained by self-assessment of health (SAH) and/or chronic illness, in addition to demographic characteristics such as age and gender.

In this paper, we define needs as the estimated demand for outpatient or inpatient services, or the OPP of the ith person, which indicates the ith smallest amount of income adjusted for household structure, with the dependent variable D_i. The explanatory variables used are age A_i, gender G_i, self-assessment of health H_i, and chronic disease S_i. Thus the estimated equations in the full version are:

$$\begin{aligned} D_i^* &= \alpha_0 + \sum_j^4 \alpha_A^j A_i^j + \sum_j^4 \alpha_{AG^j} A_i^j G_i + \alpha_G G_i + \sum_l^4 \alpha_H^l H_i^l + \alpha_S S_i + \varepsilon_i \\ D_i &= \begin{cases} 1 & \text{if } D_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \end{aligned} \qquad (2)$$

where superscripts indicate dummy variables. Age categories are divided into years as follows: 16-24, 25-44, 45-64, 65-74, and 75 plus, as in Van Doorslaer et al. (2000). Since self-assessment of health is classified into five categories, there are four dummies for this variable.

The model estimated is a heteroscedasticity-consistent probit for whether individuals utilize outpatient and inpatient services. The predicted probability, $\Phi(\hat{D}_i)$, is interpreted as Needs n in the context of this procedure. For the number of visits to the doctor or the number of days hospitalized, the negative binominal model is employed, as in previous research. These utilization variables are reported on an individual basis, for all household members. Thus, there may be intra-family correlation through income, lifestyle, or access to medical institutions. To account for this, we add random household effects to the model.

Since OPP is a continuous variable, we estimate a linear model for the log of OPP. Since OPP is a household-level variable, we cannot use individual effects.

3.2 Estimation Method

First, the Concentration Index for medical care or needs is defined following Kakwani et al. (1997):

$$2\sigma_R^2 \frac{\mu_i}{\mu} = \alpha_0 + \alpha_1 R_i \tag{3}$$

where μ_i is the demand for medical care, μ is the average of μ_i over persons, R_i is the cumulative proportion up to the ith person in order of income adjusted for household structure, and σ_R^2 is its variance. The estimated α_1 is the Concentration Index of the demand for medical care. Similarly, the Concentration Index of needs is defined by replacing μ by n, which is a measure of needs.

Following Wagstaff and Van Doorslaer (2000), the variance of the Concentration Index is adjusted as follows:

$$\begin{aligned} Var(\text{Concentration Index}) &= \frac{1}{N}\{\sum_{i=1}^{N} f_i a_i^2 - (1 + \text{Concentration Index})^2\} && (4)\\ a_t &= \frac{\mu_i}{\mu}(2R_{i-1} - \text{Concentration Index}) + 2 - q_{i-1} - q_i && (5)\\ q_i &= \frac{1}{\mu}\sum_{s=1}^{i} \mu_s f_s \end{aligned}$$

The horizontal inequity measure is obtained by using the following estimation method:

$$\begin{aligned} 2\sigma_R^2\left[\frac{\mu_i}{\mu} - \frac{n_i}{n}\right] &= \beta_0 + \beta_1 R_i && (6)\\ Var(\text{Horizontal Inequity}) &= \frac{1}{N}\left\{\frac{1}{N}\sum_{i=1}^{N}(a_i^\mu - a_i^n)^2 - \text{Horizontal Inequity}^2\right\} && (7)\\ a_i^\mu &= \frac{\mu_i}{\mu}(2R_i - 1 - \text{Concentration Index for } \mu) + 2 - q_{t-1}^\mu - q_i^\mu \end{aligned}$$

$$q_i = \frac{1}{\mu}\sum_{s=1}^{t}\mu_s f_s$$
$$a_i^n = \frac{n_i}{n}(2R_i - 1 - \text{Concentration Index for } n) + 2 - q_{t-1}^n - q_i^n$$
$$q_i = \frac{1}{n}\sum_{s=1}^{t} n_s f_s$$

The estimated coefficient of β_1 is interpreted as horizontal inequity (Wagstaff et al., 2000, Van Doorslaer et al., 2000).

4 Empirical Results

The first panel in Table 2 shows the empirical results for "Needs". Note that these numbers are the estimated coefficients and not the marginal effects, and hence they cannot be interpreted directly. It is apparent that SAH and age significantly affect outpatient utilization, but may not affect inpatient utilization and OPP. Overall, Wald tests and F tests indicate a good fit.

Table 3 indicates the distribution of actual "Needs", while predicted "Needs" are shown in Table 2. Actual utilization is higher in the highest and the lowest income groups, but this is not the case in the predicted Needs. Overall, predicted Needs do not seem to reflect income classes, except for the highest income class.

The Concentration Index, which measures inequality in utilization, is summarized in the first and third rows of Table 4. Clearly, these numbers indicate no inequality in utilization in terms of the number of outpatients or inpatient days. However, there are some progressive cases in the yes/no indicator of outpatient service or inpatient utilization in the lifetime. Moreover, the Index suggests evidence of progressiveness in OPP. In other words, the rich have tended to spend more than the poor do. However, since "Needs" have not been taken into account, we cannot discuss inequity.

Figures 1 to 7 show the Concentration Curve of each variable in the case of the without year dummy. Since these lines measure the deviation of the Concentration Index from the diagonal line, positive (negative) numbers indicate that the Concentration Curve passes above (below) the diagonal line. Thus, positive (negative) numbers imply that the poor (rich) have relatively more utilization or OPP. The Concentration Curve for utilization in Figures 2 to 6 moves around zero, but the curves in Figure 1 and 7 clearly move below zero. This leads to the positive Concentration Index in Table 4. These properties are unchanged if year and/or prefecture dummies are added as explanatory variables in equation (3).

Next, we move to the Kakwani Index, which is the Concentration Index above minus Needs. Figures 8 to 14 illustrate the difference between the actual utilization and Needs. At a glance, the lines in Figures 8 and 14 move below zero, but in the other figures, the line moves around zero. This is similar to the properties of Figures 1 to 7.

To confirm and test the impression given by the Figures, we undertake empirical investigations. The bottom row of Table 4 summarizes the empirical results for β_1 in equation (5), and the lower panel summarizes horizontal inequity adjusted for regions.

As the results indicate, the null hypothesis of no inequity cannot be rejected for the number of outpatients and the number of days of inpatient utilization. However, for the yes/no indicator of outpatients and inpatient utilization in the lifetime or OPP, the results indicate pro-rich inequity, as suggested by the figures. In addition, in the case of no year or regional dummies, inpatient utilization in the previous year indicates pro-rich inequity, even though it does not indicate any inequality in Table 4. Conversely, the Kakwani Index of OPP without year and regional dummies indicates inequity, but when we add a year dummy into equation (5), the index is significantly positive. This may reflect the changing measurement in the two survey years. With regional dummies, the magnitudes are 0.014, 0.028 and 0.082 for outpatients, inpatient in a lifetime and OPP respectively. Without regional dummies, the corresponding magnitudes are 0.020, 0.037 and 0.074. The Kakwani Index of inpatient utilization in the previous year without year or regional dummies is 0.08, which is very high compared to OPP.

5 Concluding Remarks

We found that the hypothesis that there is no inequity cannot be rejected, and Japan would have enjoyed one of the greatest degrees of equity in health care among OECD countries. However, the point estimate for the number of outpatient services without regional dummies (0.0002 to 0.0011) is larger than those for Spain (-0.0137), Ireland (-0.0098), Italy (-0.0098), and Belgium (-0.0001), and smaller than those for the UK (0.0074), Canada (0.0072), Greece (0.0273), Austria (0.0389), Portugal (0.0524), and the USA (0.0532)[1)]. Thus, Japan enjoys the best equity not only in the statistical sense, but also in the economic sense.

We can compare inpatient utilization measured in days in Japan with other OECD countries (Van Doorslaer et al., 2000). Our point estimate -0.123 is the smallest among Belgium, Denmark, Finland, the Netherlands, Sweden, Switzerland, the UK and USA[2)]. Thus, Japan has the greatest most pro-poor inequity. However, the Kakwani Index is not significant in Japan. As Belgium and the UK have significant pro-poor inequity, the extent of pro-poor inequity in Japan is behind these countries in the statistical sense.

From this study, we can learn about the huge differences between the yes/no indicator and the number of utilization days. The yes/no indicator in outpatient service always indicated pro-rich inequity, but utilization in terms of the number of outpatients never showed significant inequity. Moreover, yes/no indicators of inpatient utilization sometimes showed pro-rich inequity, but the number of days of inpatient utilization did not. Therefore, our previous research result (Ohkusa and Honda 2003a), which reported pro-rich inequity before 1997, but equity in 1998 in the yes/no indicator of outpatients, might be misleading for horizontal inequity in Japan. We cannot reconsider this result as we did not perform a survey like the one in this study before 1998. Nevertheless, we have to check the robustness of the result obtained in this research. This remains a topic for future study.

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Footnotes

1) The figures for other OECD countries are from Van Doorslaer et al. (2001). They represent utilization as total visits to a physician and incorporate regional information.

2) The eight OECD countries are from Van Doorslaer et al. (2000) in the case of inequity adjusted by age, sex, SAH, and a dummy for chronic illness. For purposes of comparison, we adopt estimated inequity without regional dummies.

References

[1] Van Doorslaer, E., Wagstaff, A., 1992. Equity in the delivery of health care: some international comparisons, *Journal of Health Economics* 11, 389-411.

[2] Van Doorslaer, E., Wagstaff, A. et al., 1997. Income-related inequalities in health: some international comparisons, *Journal of Health Economics* 16, 93-112.

[3] Van Doorslaer, E., Wagstaff, A., et al., 2000. Equity in the delivery of health care in Europe and the US, *Journal of Health Economics* 19, 553-583.

[4] Van Doorslaer, E., Koolman, X., Puffer, F., 2001. Equity in the use of physician visits in OECD countries: has equal treatment for equal need been achieved?, Equity II project, Working Paper No. 3.

[5] Kakwani, N., Wagstaff, A., Van Doorslaer, E., 1997. Socioeconomic inequalities in health: measurement, computation and statistical inference,*Journal of Econometrics* 77, 87-103.

[6] Ohkusa. Y., Honda, C, 2003a. Horizontal inequity in health care utilization in Japan, *Health Care and Management Science*, forthcoming.

[7] Ohkusa. Y., Honda, C., 2003b. Horizontal Inequity in Health Care Utilization in Japan: Comparisons with OECD Countries using an Original Survey, *manuscript*

[8] Shigeno, Y., 2000. The demand for private health insurance and public health insurance (in Japanese), *Quarterly Journal of Social Security Research* 36, 378-390.

[9] Urbanos-Garrido, R. M. 2001. Explaining inequality in the use of public health care services: evidence from Spain, *Health Care Management Science* 4, 143-157.

[10] Wagstaff, A., Van Doorslaer, E., Paci, P., 1989. Equity in the finance and delivery of health care: some tentative cross-country comparisons, *Oxford Review of Economic Policy* 5, 89-112.

[11] Wagstaff, A., Paci, P., Van Doorslaer, E., 1991. On the measurement of inequalities in health, *Social Science and Medicine* 33, 545-557.

[12] Wagstaff, A., Van Doorslaer, E., 1993. Equity in the delivery of health care: methods and findings, in: E. Van Doorslaer, A. Wagstaff and F. Rutten, (Eds.), *Equity in the Finance and Delivery of Health Care: An International Perspective*, Oxford University Press, Oxford.

[13] Wagstaff, A., Van Doorslaer, E., 1994. Measuring inequalities in health in the presence of multiple-category morbidity indicators, *Health Economics* 3, 281-291.

[14] Wagstaff, A., Van Doorslaer, E., 2000. Measuring and testing for inequalities in the delivery of health care, *Journal of Human Resources*, 716-733.

Table1: Summary Statistics

	Average	Standard	Minimum	Maximum
Outpatient				
Yes/No	.7439265	.4365346	0	1
Number	10.42587	21.04485	0	240
Inpatient[a]				
Yes/No	.0574524	.2327432	0	1
Days	2.15856	18.20843	0	365
Inpatient[b]				
Yes/No	.4794694	.4997362	0	1
Days	21.66077	59.74993	0	1200
OPP	62155.3	108338.7	652.1186	1096728
Adjusted Income	319.4429	175.1763	0	2500
Chronic disease	.0029547	.0542857	0	1
SAH				
Excellent	.1404	.1207	0	1
Good	.2608985	.4391978	0	1
Fair	.4805324	.499704	0	1
Poor	.1001664	.3002717	0	1
Very Poor	.01797	.1328646	0	1
Age class				
35-44	.2166776	.4120487	0	1
45-64	.3260013	.4688247	0	1
65-74	.0577807	.2333666	0	1
75-	.0541694	.2263888	0	1
Female	.5330266	.49899	0	1
Age class in female				
35-44	.1041735	.3055357	0	1
45-64	.165626	.3718057	0	1
65-74	.0276043	.1638632	0	1
75-	.0364772	.187505	0	1

Note: "Inpatient[a]" indicates utilization of inpatient services when the reference duration is the previous year and "Inpatient[b]" indicates utilization of inpatient services when the reference duration is the lifetime until the survey year.

Table 2: Estimation Results for Needs

	Outpatient Yes/No	Outpatient Number	Inpatient[a] Yes/No	Inpatient[a] Days
Chronic disease	-1.045501 *	-.2067976	-7.284971	
SAH				
Good	.2249545 *	.0529394	.1744287	.0460832
Fair	.4127749 ***	.2639287 ***	.1576405	-.3586596
Poor	.9521107 ***	.7134136 ***	.9689101 ***	.8027589 **
Very Poor	.7666047 **	1.144656 ***	1.917009 ***	1.976788 ***
Age class				
35-44	.060803	.0046188	-.1067994	-.7429157 **
45-64	.1377472	.2943616 ***	.1081444	-.4674477
65-74	.62589 ***	.6513819 ***	.579962 **	-.1304366
75-	.7410975 **	.8443223 ***	.6625701 **	.2316605
Female	.3012328 ***	.1603277 **	.1960088	-1.271226 ***
Age class in female				
35-44	-.1273943	.1053174	.0281784	1.137019 ***
45-64	-.0719006	.036728	-.2641426	1.339137 ***
65-74	-.1992257	.268076 **	-.5192896	1.815664 ***
75-	.1466648	.1225138	-.0392491	.9183236 **
year dummy	-.1683252 *	-.0845568 **	.2595098 **	
constant	.4662105 ***	.1183388	-2.576085 ***	4.721294 ***
Sample size	3003	2252	3003	110
No. of households	1100	1007	1100	95
log likelihood	-1538.6975	-7722.81	-577.38673	-428.42406
p-value for Wald test	$\leq$0.0001	$\leq$0.0001	$\leq$0.0001	$\leq$0.0001

(continue)

	Inpatient[b] Yes/No	Inpatient[b] Days	OPP
SAH			
Age class			
Age class in female			
Chronic disease	-.0061803	-.1769932	-.7762752 *
Good	.2374815 **	.0142394	-.0170967
Fair	.4218254 ***	-.0603613	.1687189 **
Poor	.9066628 ***	.4318681 ***	.6207846 ***
Very Poor	1.50387 ***	1.039713 ***	1.055295 ***
35-44	.0266897	-.0476653	-.0404152
45-64	.3509446 ***	.1987412 *	.082979
65-74	1.025813 ***	.0819955	.3327759 **
75-	1.136715 ***	.7517713 ***	-.0605596
Female	-.0471593	-.1521425	-.0702421
35-44	.3058874 **	.3846519 **	.0931229
45-64	.2742656 **	.1867501	.0443513
65-74	-.4427922 *	.5262953 ***	-.135499
75-	-.2268846	.3458703 *	.2762056
year dummy	.5078101 ***		.1382997 ***
constant	-1.225269 ***	.2212076 *	9.925178 ***
Sample size	3003	755	2950
No. of households	1100	417	
log likelihood	-1819.9933	-3500.7883	0.0332†
p-value for Wald test	≤0.0001	≤0.0001	≤0.0001‡

Note: The estimation method for need in the yes/no indicator of outpatient and inpatient is probit with random effects. For the number of outpatients or inpatient days, the method is negative binominal with random effects. For OPP, a heteroscedasticity-consistent linear model is used. † indicates $\overline{R^2}$ and ‡ indicates the *p*-value for the F test. *** indicates significance at the 1% level, ** at the 5% level , and * at the 10% level. Since hospitalization days of "Inpatient[a]" and "Inpatient[b]" is surveyed only in 2003, the size of the sample is about half that for other variables.

Table3: Distribution by Income Quantile

	Bottom 20%	20-40%	40-60%	60-80%	Top 20%
Actual					
Outpatient					
Yes/No	11.1	10.2	9.29	10.4	10.9
Number	.706	.753	.765	.717	.777
Inpatient[a]					
Yes/No	.044	.054	.064	.068	.055
Days	2.27	2.76	1.95	1.79	2.12
Inpatient[b]					
Yes/No	.438	.477	.487	.506	.493
Days	22.8	21.8	23.4	19.5	20.0
OPP	53410	57778	51650	66900	80577
Estimated					
Outpatient					
Yes/No	9.63	9.80	10.3	9.41	9.76
Number	.835	.827	.824	.825	.820
Inpatient[a]					
Yes/No	.038	.033	.039	.031	.027
Days	1.59	2.36	3.07	2.68	2.66
Inpatient[b]					
Yes/No	.482	.475	.466	.482	.479
Days	48.6	51.6	49.4	52.8	50.8
OPP	62957	61969	63052	61736	61391

Note:

Table4: Concentration Index

	Year	Index	p-value	95% Lower bound	95% Upper bound
without regional dummies					
Outpatient					
Yes/No	no	.0133001	0.036	.0008926	.0257075
	yes	.0128394	0.043	.0004304	.0252484
Number	no	-.0014481	0.950	-.0466945	.0437982
	yes	-.003452	0.881	-.0484953	.0415914
Inpatient[a]					
Yes/No	no	.0238123	0.561	-.0565128	.1041375
	yes	.0291438	0.478	-.0514387	.1097263
Days		-.026409	0.841	-.2842658	.2314479
Inpatient[b]					
Yes/No	no	.0207744	0.107	-.0045064	.0460552
	yes	.02566	0.042	.0009741	.050346
Days		-.0195206	0.584	-.0894058	.0503645
OPP	no	.073927	0.001	.0319765	.1158776
	yes	.0748255	0.000	.0328541	.116797
with regional dummies					
Outpatient					
Yes/No	no	.0191708	0.004	.0061655	.032176
	yes	.0188095	0.005	.005814	.0318049
Number	no	-.0158913	0.506	-.0627827	.0310002
	yes	-.015044	0.529	-.0619071	.0318191
Inpatient[a]					
Yes/No	no	.0199909	0.642	-.0643915	.1043734
	yes	.0181376	0.675	-.0665442	.1028194
Days		-.0117427	0.926	-.2583283	.2348428
Inpatient[b]					
Yes/No	no	.0321469	0.015	.0062303	.0580635
	yes	.0313325	0.018	.0054453	.0572196
Days		.0080052	0.818	-.0602076	.076218
OPP	no	.065327	0.002	.0234634	.1071906
	yes	.0659555	0.002	.0238636	.1080474

Note: ”Year” indicates whether the estimated index takes year dummies into the estimation equation.

Table5: Kakwani Index

	Year	Index	*p*-value	95% Lower bound	95% Upper bound
without regional dummies					
Outpatient					
Yes/No	no	.0140893	0.024	.0018742	.0263043
	yes	.0141709	0.023	.0019533	.0263885
Number	no	.0011258	0.956	-.0393327	.0415844
	yes	.0002138	0.992	-.0400582	.0404858
Inpatient[a]					
Yes/No	no	.0807551	0.046	.0013508	.1601594
	yes	.0794159	0.051	-.0003121	.1591439
Days		-.1231977	0.182	-.304077	.0576816
Inpatient[b]					
Yes/No	no	.0287579	0.021	.0043901	.0531256
	yes	.0279234	0.025	.0035536	.0522932
Days		-.0232047	0.433	-.0811936	.0347842
OPP	no	-.0232047	0.433	-.0811936	.0347842
	yes	.0828898	0.000	.041062	.1247176
with regional dummies					
Outpatient					
Yes/No	no	.0201333	0.002	.0073386	.0329281
	yes	.0196416	0.003	.0068732	.03241
Number	no	-.009268	0.665	-.0512617	.0327258
	yes	-.0087318	0.683	-.0507228	.0332591
Inpatient[a]					
Yes/No	no	.0770748	0.074	-.0075017	.1616514
	yes	.0758128	0.079	-.0088642	.1604898
Days		-.0970992	0.279	-.2728992	.0787008
Inpatient[b]					
Yes/No	no	.0374557	0.004	.0118865	.0630249
	yes	.0373853	0.004	.0118218	.0629489
Days		-.0047643	0.868	-.061018	.0514893
OPP	no	.0739336	0.001	.0317866	.1160806
	yes	.0750902	0.001	.0327101	.1174704