An Analysis of the Difference between Urban and Rural Areas in Outpatient Health Service Utilization

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This study assesses and quantifies region-related inequity in the health service utilization just after the introduction of separation of dispensary from medical practice. Regression-based approach was used for assessment and quantification of the equity using data from the 2001 National Medical Care Resources and Utilization Survey. The regression-based test results for analyzing region-related inequity suggested that there is a favorable inequity for rural area than urban area in terms of entry into outpatient health services, the number of outpatient visits and the total out-of-pocket costs of outpatient health services. From these kind results, we can insist that there is inequity in outpatient health services. That is more favorable inequity in rural areas than urban areas. But we cannot insist that we need to shape a policy to increase outpatient health service utilization in urban areas or to reduce or balance it out in rural areas because we do not know what level of utilization is appropriate or which level, of rural area or urban area, is appropriate. So we need to assess the appropriateness of health service utilization they used. The assessment of health service utilization is another topic, not this research. Also this kind issue is too difficult to deal with under current situation.

Key Word: Equity, Health Service Utilization, Region-related Inequity

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I. Introduction

The goal of public health policy is to improve quality, efficiency and equity in the health care sector. Among these, equity, in particular, has been pursued by human society for a long time. The issue of equity has been at the core of the health care sector, whose primary policy concern is people's life. Human needs for health should be fulfilled based on equitable distribution of health care resources (Young-Gi Kim, 1994). One means to accomplish this goal is public provision of adequate health care services, which is one of the necessary conditions for well-being.

Meanwhile, the ultimate goal of a health care system is to raise national health standards. Thus studies concerning public health policy explore the determinants of health and the ways of controlling them. Although there are numerous factors affecting health, we can classify them into 'biological factors', 'environmental factors', 'lifestyle-related factors', and 'factors related to health care system'. These are factors that can also cause inequity. In order to address the problem of inequity in health, we have to simultaneously deal with all these factors and interactions between them. Such task should be based on sufficient understanding of these factors. However, we can often find the relationship between health and these factors inexplicable. Worse still, it is hard to collect reliable data to verify their relationship. Unlike the case of other factors, however, correlation and causality between health and factors related to health care system has been verified to a certain

extent of appropriate possible causation with health. Generally, the inequity field in the health care system can be roughly divided into health care finance system and health care delivery system. Here health care delivery system means efficient and effective offering of health care to the beneficiaries (Il-Soon Kim, 1983).

Although the equity in health care service is very important, most of research works done so far in Korea have been focused on an efficiency of health care system. Those varieties of definition for equity, inadequate measurement and political sensitivity precluded the research on inequity or equity of the health care field. However, we can't ignore equity problem, because we cannot achieve the ultimate goal of public policy in the health care without resolving inequity problem. Thus in this research I have emphasized inequity in health care system among influential elements of health problem and especially focused on the health care delivery system. The concept of health care delivery system consists of adequate health care service development and accessibility of the patient to offer health care. But here I have focused on health care use, mostly. In this research, the main theme is the health care difference among regions, especially between urban and rural area though there could be variety of difference in health care use, including social status, gender, race, region, etc. We are interested in the difference between the rural and urban area because the health care is pure public sector goods, and is distributed according to regional characteristic and it may cause imbalance of health care use. Thus the correction of inequity through the analysis of regional health use difference could bring important policy alternative to correct social inequity.

In 1977, Korea introduced health insurance system so that the citizens may use adequate health care through diversification of

risks. In July 1989, 12 years after the introduction of health insurance system, Korea achieved national insurance coverage for all the people by expanding coverage to urban self-employers (Kun-Yong Song and others, 1990, 1993; Jung-Soo Choi, 1995; Jung-Ja Nam, 1998). Even though the health insurance coverage expanded nationwide, the social structural problem of severe inequity which appeared first in industrialization process, caused many problems including urban concentration of the health care resources and rural area residents has been put in disadvantaged situation comparing with urban residents though they have been released from economic constraint. That is, rural area residents seems to have less health care use (Kun-Yong Song and Hong-Sook Kim, 1982; Ok-Ryun Moon, 1989). There has been controversy about continuance of health care use difference between urban and rural area even after national health insurance system started (Byung-Ik Kim, 1989; Bong-Min Yang, 1989). However, when we look into health care use rate for regional insurance user from health insurance association, yearly number of visiting to doctor per person), in 1990 & 1991, urban area residents had higher health care use rate than rural area residents, but in 1993, 1994 & 1995, rural area residents had higher medical care use rate and there was no essential difference in 1992 between urban and rural area.

Although such results of investigation might be hard to compare directly due to different individuals treated, there appear similar results from analysis of Korea National Health & Nutrition Survey Data conducted by the Korea Institute for Health and Social Affairs (KIHASA) in every 3 years. That is, the number of visit to doctors including clinics, hospitals and health care institutions per person of urban and rural area was 6.65 and 5.67 times, respectively, so that urban area had higher rate. But rural area had 2.31 times higher in

1992 with 10.58 times of rural residents and 8.27 times of urban residents. In 1995 average number of visit to doctors including drug stores during two weeks period was 2.45 and 2.44 times of rural and urban area, respectively showing a little higher rate in rural area, while in 1998, the number of visiting to doctors during the same 15-days period was 2.26 times and 2.47 times of urban area so that there was a little decrease of health care use in rural area (The Korea Institute for Health and Social Affairs, 1992, 1993, 1995, 1998)

However there have been not only enough research works on the health care use difference among regions, but also such research works have been intended to establish policies based on the results of the analyses of the causes of health care use assuming the existence of regional difference of health care use, or simply based on existing investigation data or publicized statistic data, rather than confirming the difference in health care use (Yung-Ki Kim, 1994; Yung-Gyun Kim, 1995) or they tried to assess the existence of inequity in health service use just by controlling gender or age without consideration on basic health need factors like health status, gender and age simultaneously (Gyung-Sik Joo et al., 1996, Dong-Min Jang et al., 1996). Thus in this research, as expressed before, I would like to discuss about equity related to accessibility to health care use in the domain of health care delivery system. Although the equity of health care use has variety of definitions and estimation method according to individual scholars, lately following definitions are used among health care policy makers and health economists, centered on U.S.A. and Europe; Equity in health service utilization is defined as follows: individuals with the same health needs must be treated equally, irrespective of income (Wagstaff et al,1991; Wagstaff & Doorslaer, 1992; Puffer, 1993;

Paci & Wagstaff, 1993). Thus, in order to see whether there exists difference between urban and rural areas in health care use and to see the degree of the difference if it does, the study should be done in view of equity. In other words, after we control health status, gender, and age which reveal health care use difference, that is, assuming the same of health status, gender and age, we need to assess whether or not there could exist health care use difference between urban and rural areas and then we need to measure the degree. By doing so we could establish the goal to accomplish the equity and establish more adequate health care policy to accomplish the goal. Without such as the above analysis, if we make such conclusion and establish health policy that rural area has higher health care use rate than urban area and there is no problem or vice versa only based on the simply results of health insurance payment request data or survey data, we should be mistaken.

Thus the objective of this research is to deduce actual proof for the difference between rural and urban areas in outpatient health services after the introduction of separation of dispensary from medical practice and the degree if the difference exists, using the regression based approach, unlike other researches done so far.

Ⅱ. Literature Review

For discussing the topic of equity, we need to clarify the concept of equity and the difference between equity and equality. We often use equity and equality interchangeably, but the former means fairness for demand based on social justice and the latter means numerical equal distribution. In health sector, it has been broadly

accepted that health services must be distributed based on health need, and that its finance is based on ability to pay. This is referred to as a broad equity definition. That is, we can say that equity in a health system has been attained when someone pays health care costs based on ability to pay and uses health services when needed. This means that equity is involved both in the health care finance system and the health care delivery system. From now on, equity in health service utilization rather than health care finance has mainly been focused. We may distinguish the studies on equity in health sector, as ‘equality of health’, ‘equal utilization for equal need’, and ‘equal access for equal need’ (Le Grand, 1982; Wagstaff, et al., 1991; Mooney, 1994).

In views of ‘equality of health’, a representative report for social inequality approached from the side of social structure is Black Report (Townsend, et al., 1982). Except that, other overseas studies of inequality in health care delivery system has primarily focused on death rate, particular disease rate, pointing health standard (Feldman J.J., 1989; Fix A.G., 1991; Laheima E., 1990; Roget E., 1992). Most examined topics are social and economic variables like income, education standard and unemployment as the elements influencing health standard

In view of ‘equal utilization for equal need’, equity in health service utilization is defined as follows: individuals with the same health needs must be treated equally, irrespective of income. So, they try to compare health care expenses among income classes while controlling health need factors. Representative researchers of this point of view are of Le Grand, Collins and Klein, Puffer, and Wagstaff et al. The works of Le Grand, Collins and Klein, Puffer, and Wagstaff et al. will be examined in order.

Le Grand (1978) analyzed equity in health service utilization,

using data from the British National Health Services. To measure equity, he estimated health expenditures per sick person (total health expenditures of each income group/sick persons of each income group) and compared the portion of health expenditures of each group among total health expenditures with the portion of sick persons of each group among total sick persons. He concluded that the British National Health Services did not attain equity in the delivery of health services, since, for the high income group (first quartile), 13 percent were sick persons, while the portion of health expenditures among total health expenditures was 16 percent; for the low income group (fourth quartile), the portion of health expenditures was relatively low (27.3 %) compared to the portion of sick persons (31.9 %). His method has been criticized on several points. First, when measuring inequity, his method focuses exclusively on the exclusively on the extreme classes, that is, comparison between the bottom and top income groups(Wagstaff, 1991). Second, he does not consider non sick persons who used health services since he assumes that those who are ill receive health services, which, according to Collins and Klein (1980), results in committing the ecological fallacy. Third, he assumes that sick persons have the same health needs, irrespective of the type of disease (chronic disease or acute disease). Fourth, he fails to control demographic factors that may cause confounding effects.

Collins and Klein (1980) analyzed equity among income groups, classifying health needs into three categories, the non-sick, the acutely sick, and the chronically sick, in order to avoid the ecological fallacy, which results from including only sick persons, one of the problems of Le Grand's work. However, their method also has problems: first, even when inequity exists, the health care expenditures between chronic and acute condition groups may be

the same; and second, their method can not quantify equity (Wagstaff, 1991).

Puffer (1986) analyzed the effects of household income on primary health care utilization applying an ordered probit model, using data from the 1977 US National Medical Care expenditure Survey and the 1980 UK General Household Survey. He used a regression-based approach to overcome some of problems of Le Grand's work. Puffer estimated an equation relating health services usage to measures of health status, income, age, sex, and interaction terms between income and the other variables. But, Puffer still did not quantify of an inequity of health service utilization.

Wagstaff, et al. (1989) suggested the use of the concentration curve approach to overcome the problem of focusing exclusively on the extreme classes. This is an illness concentration curve, which plots the cumulative proportions of the population ranked by income against the proportions of persons reporting illness. This illness concentration curve is then compared to an expenditure concentration curve, which plots the cumulative proportion of the population against the proportion of total expenditure received. The extent of inequity can be assessed by looking at the size of the area between the two concentration curves. This method also avoids one problem of the emphasis on range measures of inequality, but it does not overcome the other problems of Le Grand's work.

Wagstaff, et al. (1991) also assessed equity, using data from Italy and the Netherlands. They used an index of inequity based on standardized expenditure shares to quantify equity. This value, which can be interpreted as the expenditures each income group would receive if it had the age distribution and the morbidity of the population as a whole, can be computed using the direct standardization method or regression analysis. If OLS is used, the

two methods are equivalent. They assess the extent of any inequity by looking at the difference between medical care utilization of the poor (m_p) and medical care utilization for the rich (m_r). This difference can be written by $m_r - m_p = (a_r - a_p) + h(b_r - b_p)$, where a_r and a_p are intercepts of health care expenditure equations of the rich and the poor, respectively. In this decomposition, the degree of inequity affecting a given morbidity category is weighted by the fraction of the population in that category. Thus, the entire population is affected by any differences by a discrepancy in the bs. The problem is that this index is very sensitive to which variables among health need factors are selected. Furthermore, this method finds standardized medical expenditures distribution to be less pro-poor or more pro-rich when including several health need factors simultaneously than when including one health need factor (Doorslaer et al., 1992).

III. Methods

1. Research Question

The main research question is “Is there any region-related inequity in the delivery of health care in Korea after the introduction of separation of dispensary from medical practice ?” More specifically, this study addresses the following issue: The rural residents are less likely to use outpatient health services than the urban residents when controlling health need and demographic factors.

2. Data

Data from the 2001 National Medical Care Resources and Utilization Survey will be used for this study. The Survey is a nationwide household interview survey of non-institutionalized civilians and provides national data on the incidence of illness, the prevalence of chronic disease, and the utilization of health services. The household interviews were conducted during the 25-day period from Feb. 12 to Mar. 8, 2001. Through a complex sampling process, a set of about 3,521 households were selected. A total of 2,861 households among 3,521 sample households, which have a total of about 11,135 individuals, were interviewed with a 81.3 percent response rate.

3. Research Variables

Three measures of health service utilization used to assess equity are: (1) use or nonuse of the health services, (2) physical units of health service utilization, and (3) total expenditures for the health services. Each measure has its own problems in quantifying demand. Use or nonuse measures participation in health service utilization, separating user and nonuser's characteristics. Physical units of utilization such as physician visits or days in hospital appear to measure real resource use, but they suffer in practice from incompleteness. Physician visits in outpatient services measures frequency but not the intensity of services. Admission rate and length of hospital stay, also, do not completely measure it. Expenditures provide a ready metric for aggregating disparate services. But they also suffer from two potential disadvantages: first, the price for the same health services may vary by the type of health insurance, region, and health facilities; and second, in so far

as price does not reflect marginal cost, variation in expenditures has an ambiguous welfare implication (Newhouse, 1981). As a consequence, all three are used in the analysis.

Dependent variables for this study are as follows: (1) whether or not to use outpatient health services during the 15 days (OP); (2) the number of outpatient visits (OPVST); and (3) total out-of-pocket costs of outpatient health services (OPCOST). Explanatory variables used in this study include age, gender, health status, and region. Data on age and gender were included as explanatory variables. The gender data was coded 0 for male and 1 for female. The age data was recoded as a set of dummy variables for six age categories, the excluded one being 15 to 29 years. Measures of health status in this data set include chronic illness, disease for 15 days, sick days and perceived health status. However, the inclusion of all health status variables in one equation may cause a potential multicollinearity problem. Therefore, factor analysis was used to extract a common health index from several health-related variables such as sick days, bed days, disability days and perceived health status, to overcome potential multicollinearity. One of the factors is a 'Health Need Factor 1' that is a kind of acute disease status with moveless condition and the other is a 'Health Need Factor 2' that is a kind of chronic disease condition. Place of residence variable is coded into two regions of urban and rural areas, but in this study, this variable is coded as a dummy variable takes the value of 1 if the region is urban area, and zero if not.

4. Methods for Assessing Inequity

As mentioned previously, even though equity is involved both in the health care finance system and the health care delivery system,

I will focus on equity in health service utilization rather than health care finance. That is, I will assess whether individuals with the same health needs must be treated equally, irrespective of income. In particular, I will assess and quantify equity for entry into the health service market; and equity for quantity of health service by using a regression-based approach.[1] This approach controls various confounding factors that may affect health service utilization and

Table 1. Restricted and Full Models for Assessing Region-related Equity

	OP		OPVST		OPCOST	
	R	F	R	F	R	F
			Sel	Out	Sel	Out
Gender:						
Male[1)]	-	-	-	-	-	-
Female	X	X	X	X	X	X
Age:						
0～ 4	X	X	X	X	X	X
5～14	X	X	X	X	X	X
15～29[1)]	-	-	-	-	-	-
30～44	X	X	X	X	X	X
45～59	X	X	X	X	X	X
60 and over	X	X	X	X	X	X
Health status:						
Health need factor 1	X	X	X	X	X	X
Health need factor 2	X	X	X	X	X	X
Place of Residence						
Rural[1)]	-	-	-	-	-	-
Urban	-	X	-	X	-	X
Etimation Methods	Probit		Two-stage method with MLE		Two-stage method with MLE	

Note: R: Restricted Model; F: Full Model; Sel: selection equation; Out: outcome equation; and 1) reference group

1) The approach is a regression analysis of estimated demand for health services to test the hypothesis that the relationship between the amount of health services received and the determinants of utilization is the same for all income groups and for all region groups. See, for example, Puffer (1986), Wagstaff (1991), and Doorslaer & Wagstaff (1992)

also allows for quantification of equity. First, in the case of equity for entry into health service market(equations 1(OP)), I will assess and quantify differences in entry into the health service market between rural and urban areas controlling for health need, age, and gender by using the probit model which has advantage of the convenient properties of the normal distribution. Second, in the case of equity for quantity of outpatient health services (equations 2(OPVST), 3(OPCOST)), equity for outpatient health services between rural and urban areas after controlling for health need, age, and gender will be assessed and quantified by the two-stage method with MLE[2](See Table 1).

The following is the log-likelihood function for the two-stage method with MLE:

$$L = \sum_{z=0} \log(1-\Phi i) + \sum_{z=1} \log \frac{1}{\sqrt{2\pi\sigma_\varepsilon^2}} - \sum_{z=1} \frac{1}{2\sigma_\varepsilon^2}(yi - x_i'\beta)2 + \sum_{z=1} \log\Phi\left[\frac{v_i'\alpha + \rho\left(\frac{yi - x_i'\beta}{\sigma\varepsilon}\right)}{(1-\rho 2)^{1/2}}\right]$$

The hypothesis that persons in the same degree of health need receive the same treatment, irrespective of their place of residence, will be tested by the log-likelihood ratio statistic to assess whether

2) These kinds of health service utilization data have censored problem due to mainly the choice of consumers, not a result of unobservability (Maddala, 1995). That is why OLS and the Tobit model are not appropriat for these kinds of dat. The appropriatemetho is the two stage method such as Heckman's two-stage method and the two stage method with MLE. It is known that the two-stage estimation used to estimate the demand models is very sensitive to distributional assumptionswhil though the two-stage method with maximum likelihood is less sensitive than Heckman's two-stage (Maddala, 1985). Normality and homoskedasticity are more important problem in sample selection models than in ordinary least squares. This is because OLS estimators are consistent under nonnormality and/or heteroskedasticity, whereas sample selection estimators are not consistent (Amemiya, 1984). Therefore, it is necessary to test normality and homoskedasticity of the selection equation.

equity exists. That is, I will test explicitly for differences in the demand models for health services such as the entry into health service market, the number of health services, and the expenditure of health services between rural and urban areas by comparing the results of the demand models (full model) to a more restricted model that imposes equality of coefficients across rural and urban areas (the restricted model). After assessing whether equity exists or not, I will quantify equity based on standardized utilization shares. This value, which can be interpreted as the health service utilization each sub-group would receive if it had the age and gender distribution and the morbidity of the population as whole, can be computed using a regression based approach. That is, I can assess the extent of the any inequity by looking at the difference among health care utilization of sub-groups.

Ⅳ. Results

This chapter considers the results of some regression-based tests[3] for region-related inequities in health service utilization. To determine whether the utilization of the health care system is distributed equitably, the likelihood ratio test was used. That is, I tested explicitly for differences in the demand models for health services such as the entry into the health service market, the quantity of health services used and the total out-of-pocket costs of health services between rural and urban areas by comparing the results of

3) The approach is a regression analysis of estimated demand for health services to test the hypothesis that the relationship between the amount of health services received and the determinants of utilization is the same for all region groups.

the full demand models to a more restricted model that imposes equality of coefficients between rural and urban areas.

1. Descriptive Analysis

Table 2 shows the general characteristic of gender, age and health status level of urban and rural area residents. When we compared the distributions between gender and among age in urban and rural areas, there was more female than male in both areas, and in rural area age 60 or over was 28.2%, which was 3 times more than 9.1% of urban area.

Table 2. General Characteristics of Residents of Urban and Rural Areas

	All		Rural Area		Urban Area	
	N	%	N	%	N	%
Gender:						
Male	11,135	48.5	2,088	48.0	9,046	48.7
Female	11,135	51.5	2,088	52.0	9,046	51.3
Age:						
0～ 4	11,135	6.3	2,088	4.5	9,046	6.7
5～14	11,135	15.6	2,088	14.5	9,046	15.9
15～29	11,135	22.5	2,088	15.4	9,046	24.1
30～44	11,135	27.0	2,088	19.1	9,046	28.8
45～59	11,135	15.9	2,088	18.3	9,046	15.4
60 and over	11,135	12.7	2,088	28.2	9,046	9.1
Health status:						
Health need factor 1	11,135	0.011	2,088	-0.230	9,046	0.066
Health need factor 2	11,135	-0.005	2,088	0.016	9,046	-0.009

Note: Figures in Health Need Factor percent(%) cells 1 & 2 are mean values.

2. Analysis of Difference in Outpatient Health Services

A. Probability of Using Outpatient Health Services

This equation estimates the probability of an outpatient health service use rather than no health service use during a 15 day period using a probit model and distinguishes outpatient health service users from nonusers. Table 3 shows the estimated results of the specification for the entry into the outpatient health service market and the result of a likelihood ratio test to assess region-

Table 3. The Estimated Results of Outpatient Health Service Use Using Probit Model

	Restricted Model		Full Model	
	Coefficient	Z	Coefficient	Z
Gender:				
Male	0.199	6.414	0.200	6.428
Female	-	-	-	-
Age:				
0～ 4	0.772	11.498	0.771	11.477
5～14	0.369	6.911	0.363	6.793
15～29	-	-	-	-
30～44	0.201	4.148	0.200	4.133
45～59	0.685	13.104	0.675	12.888
60 and over	1.224	22.075	1.191	21.109
Health status:				
Health need factor 1	0.361	24.141	0.363	24.246
Health need factor 2	-0.001	-0.096	-0.001	-0.095
Place of Residence:				
Rural Area	-	-	-	-
Urban Area	-	-	-0.121	-3.069
Constant	-1.356	-32.793	-1.252	-23.472
-2 Log Likelihood	8,551.75		8,546.13	
Log-Likelihood Ratio			5.62	
P			0.005<P<0.01	
Sample Size	9,048		9,048	

related inequity of outpatient health service use. Two models each are presented for entry into the outpatient health service market: model 1 is a full model estimate, which includes the region, health status variables, and demographic variables (all age groups, and gender); and the model 2 is a restricted model excluding only the region from the full model. If the resulting test value for each equation, which is distributed asymptotically as a chi-squared random variable, is larger than the critical value of the chi-square distribution with the number of restrictions as the degrees of freedom, then this suggests that there is a statistically significant difference in outpatient health service utilization among region groups. For demand equation for the probability of entry into outpatient health service market, the likelihood ratio test statistic for the region variable terms, denoted LR(2,1) is significant. Thus, there seem to be differences in the probabilities of outpatient health services between urban and rural areas.

According to above test result, there exist region-related inequities in the probability of entry into outpatient health service market.

Table 4. The Probabilities of Outpatient Health Service Use Between Urban and Rural Areas

	Probability of Outpatient Health Service Use			
	Observed Probability		Predicted Probability[1)]	
	Prob.	(A/B)	Prob.	(A/B)
Rural Area (A)	0.28	1.33	0.233	1.15
Urban Area (B)	0.21		0.203	

Note: 1) It is the probability of use of outpatient health services when age, gender, and health status variables are fixed to their means using probit model

Table 4 shows that the magnitudes of differences in access to health services between rural and urban areas. The observed

probabilities of outpatient health services in rural and urban areas are 0.28 and 0.21, respectively, so the probability of outpatient health services of rural residents is higher than that of urban residents. But the predicted probabilities of outpatient health services in rural and urban areas are 0.23 and 0.20, respectively when I controlled intrinsic health need variables such as gender, age, and health status. Though this kind of difference decreased from 1.33 times to 1.14 times, there is a favorable inequity for rural areas.

B. The Number of Outpatient Health Service Visits

This equation estimates the number of outpatient visits conditional on outpatient health service use during the 15-day period. This demand equation (the outcome equation) is also estimated simultaneously along with a selection equation that estimates the probability that the individual had received outpatient health services during the 15-day period to correct for selection bias.[4)]

Table 5 shows the estimated results of the specification for the outpatient visits and the result of a likelihood ratio test to assess region-related inequity of outpatient visits. Two models each are

4) As stated previously, thisequati applied the two-stage estimation with maximum likelihood, because the ordinary least squares and The Tobit models are inappropriate for this stud We checked normality and heteroskedasticity as stated previously and the efficiency of the method to correct sample-selection bias. According to the results of normality and heteroskedasticity tests, Lagrange Multiplier statistics for each test were zero. Next, with respect to efficiency, according to Nelson (1984), bias in OLS coefficients will increase when neither of the following two conditions is met: (a) if the error correlation, ρ, is zero; or (b) if the estimate of λ is not correlated with the explanatory variables in the outcome equation. However, the error correlation between the selection equation and outcome equation, ρ, is more than 0.9 in the equation for the number of outpatient visits given an outpatient health service use. R-squares for regressing λ on the explanatory variables in the outcome equations are more than 0.8 for the equations for the number of outpatient visits.

Table 5. The Estimated Results of the Number of Outpatient Health Service Visits Using Sample Selection Model

	Restricted Model		Full Model	
	Coefficient	Z	Coefficient	Z
Gender:				
Male	0.326	5.057	0.000	-0.006
Female	-	-	-	-
Age:				
0～ 4	2.078	15.648	0.982	9.511
5～14	0.999	8.937	0.313	3.208
15～29	-	-	-	-
30～44	0.943	9.180	0.159	1.767
45～59	1.807	16.533	0.515	5.504
60 and over	2.426	20.478	0.922	9.514
Health status:				
Health need factor 1	0.424	18.051	0.260	14.190
Health need factor 2	0.095	4.888	0.068	5.430
Place of Residence:				
Rural Area	-	-	-	-
Urban Area	-	-	-0.231	-3.523
Constant	-2.381	-25.139	-0.476	-4.619
σ	2.198	118.169	1.679	143.571
ρ	0.987	744.620	0.950	102.258
-2 Log Likelihood[1)]	16244.8		15871.4	
Log-Likelihood Ratio			34.34	
P			P<0.005	
Sample Size	2,047		2,047	

Note: 1) This statistic includes the log-likelihood from both the selection and the outcome equations.

presented for the outpatient visits: model 1 is a full model estimate, which includes the region, health status variables, and demographic variables (all age groups, and gender); and the model 2 is a restricted model excluding only the region from the full model. If the resulting test value for each equation, which is distributed asymptotically as a chi-squared random variable, is larger than the critical value of the chi-square distribution with the number of

restrictions as the degrees of freedom, then this suggests that there is a statistically significant difference in outpatient health service utilization between urban and rural areas. For the equations for the number of outpatient health services, the test statistic LR(2,1) for the region variable term is significant in the equation for number of outpatient visits. Thus, there seen to be differences in the number of outpatient visits that are related to region.

According to above test results, there exist region-related inequities in number of outpatient visits.

Table 6 shows that the magnitudes of differences in the number of outpatient health services between rural and urban areas. The observed number of outpatient visits in rural and urban areas are 1.82 and 1.96, respectively, so the number of outpatient visit of rural residents is lower than that of urban residents. But the predicted number of outpatient visits in rural and urban areas are 1.72 and 1.54, respectively after I controlled intrinsic health need variables such as gender, age, and health status. So in terms of the observed number of outpatient visit, rural residents are lower than urban residents, but in terms of predicted number of outpatient visit, rural residents are higher than urban residents.

Table 6. The Number of Outpatient Health Service Visits Between Urban and Rural Areas

	Outpatient Health Service Visits			
	Observed Visits		Predicted Visits[1)]	
	Number	(A/B)	Number	(A/B)
Rural Area (A)	1.82	0.93	1.722	1.11
Urban Area (B)	1.96		1.545	

Note: 1) $E[y|z = 1] = x\beta + \sigma\rho(\phi(z) / \Phi(z))$: The predicted number of visits are given when age, gender and health status are fixed to their means.

C. Total Out-of-Pocket Costs of Outpatient Health Service

This equation estimates the total out-of-pocket costs of outpatient visits conditional on outpatient health service use during the 15-day period. This demand equation (the outcome equation) is also estimated simultaneously along with a selection equation that estimates the probability that the individual had received outpatient health services during the 15-day period to correct for selection bias.[5)]

Table 7 shows the estimated results of the specification for the total out-of-pocket costs of outpatient health services and the result of a likelihood ratio test to assess region-related inequity. Two models each are presented for the total out-of-pocket costs of outpatient health services: model 1 is a full model estimate, which includes the region, health status variables, and demographic variables (all age groups, and gender); and the model 2 is a restricted model excluding only the region from the full model. For the equations for the total out-of-pocket costs of outpatient health services, the test statistic LR(2,1) for the region variable term is significant in the equation for the total out-of-pocket costs of outpatient health services. Thus, there seem to be differences in the total out-of-pocket costs of outpatient health services that are related to region. According to above test results, there exist region-related inequities in the total out-of-pocket costs of outpatient health services.

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5) According to the results of normality and heteroskedasticity tests, Lagrange Multiplier statistics for each test were zer. For theefficiency test, the error correlation between the selection equation and outcome equation, ρ, is more than 0.9 in the equation for thetotal out-of-pocket cost given an outpatient health service us R-squares for regressing λ on the explanatory variables in the outcome equations aremore than0 for the equations for thetotal out-of- pocket cost.

Table 7. The Estimated Results of Logarithm of Total Out-of-Pocket Cost of Outpatient Health Service Using Sample Selection Model

	Restricted Model		Full Model	
	Coefficient	Z	Coefficient	Z
Gender:				
Male	-0.061	-0.447	-0.078	-0.555
Female	-	-	-	-
Age:				
0～ 4	-0.422	-0.901	-0.431	-0.895
5～14	-0.631	-2.437	-0.616	-2.367
15～29	-	-	-	-
30～44	-0.286	-1.806	-0.272	-1.702
45～59	-0.326	-0.764	-0.287	-0.664
60 and over	-1.003	-1.354	-0.895	-1.204
Health status:				
Health need factor 1	-0.094	-0.433	-0.105	-0.468
Health need factor 2	-0.024	-1.684	-0.022	-1.535
Place of Residence:				
Rural Area			-	-
Urban Area			0.439	4.115
Constant	4.730	3.228	4.406	3.050
σ	1.349	26.325	1.335	32.583
ρ	0.703	43.138	0.782	45.009
-2 Log Likelihood[1)]	15637.94		15591.60	
Log-Likelihood Ratio			46.34	
P			P<0.005	
Sample Size	2,047		2,047	

Note: 1) This statistic includes the log-likelihood from both the selection and the outcome equations.

Table 8 show that the magnitudes of differences in the total out-of-pocket costs of outpatient health services between rural and urban areas. The observed outpatient out-of-pocket costs in rural and urban areas are 15,624 Won and 26, 537 Won, respectively, in which rural area is 41 percent less than urban area. But the predicted outpatient out-of-pocket costs in rural and urban areas are

14,111 Won and 19,776 Won, respectively in which the gap between them decreased slightly, but there is no opposite direction unlike the number of outpatient visits.

Table 8. The Total Out-of-Pocket Cost of Outpatient Health Service Between Urban and Rural Areas

(unit: won)

	Outpatient Health Service Costs				
	Observed Costs		Predicted Costs[1)]		
	Costs	(A/B)	Log(Costs)	Costs	(A/B)
Rural Area (A)	15,624	0.59	4.95	14,111	0.71
Urban Area (B)	26,537		5.29	19,776	

Note: 1) $E[y|z = 1] = x\beta + \sigma\rho(\phi(z) / \Phi(z))$: The predicted out-of-pocket costs are given when age, gender and health status are fixed to their means.

When we postulate the reason that total out-of-pocket costs was higher in urban area, first there could be highly observed number of visits by urban area residents than rural area residents, and in turn it brought higher total out-of-pocket costs, and secondly, there could be lower health care price for rural area residents and they may use public health institution more, including health center etc. But, we can't determine simply which one would make the health users better off just after we compare total out-of-pocket costs under same health care need by users of same age, sex and health condition because we do not know what level of utilization is appropriate or which level, rural area or urban area, is appropriate. One thing clear is, when we assume same health insurance application for a disease, the less health care expense would be more efficient for same health care service in urban and rural area.

V. Conclusions

This paper answers the following research question using the 2001 National Medical Care Resources and Utilization Survey Data: Is there any inequity in the delivery of health services in Korea? Three measures of health service utilization used to assess the equity are defined in this study: (1) use or nonuse of health services; (2) physical units of health service utilization; and (3) total expenditures for health services. In relation to these three measures, 3 demand equations are estimated to assess the equity.

A regression-based approach was used to assess and quantify inequities for entry into health service market such as equations 1(OP: whether or not to use outpatient health service), 2 (OPVST: the number of outpatient visits), and 3 (OPCOST: the total out-of-pocket costs of outpatient health services). This approach controls various confounding factors, which may affect health service utilization and also allows for quantification of equity. The probit model was applied to the first three demand equations for entry into health service market with binary dependent variable because it takes advantage of the convenient properties of the normal distribution. For the last two demand equations for quantity of health service utilization with a continuous dependent variable with selection problem, the two-stage method with maximum likelihood was applied instead of tobit model because ordinary least squares or tobit model is not appropriate under the situation in which censoring occurs because mainly of the choice of consumers, not a result of unobservability.

Results of assessment of inequity in health service utilization will be briefly reviewed. First of all, the results of analyses of assessing

whether equity exists or not show that there exist region-related inequities in the probability of entry into outpatient health service market. Also, for outpatient health services, region-related inequity exists in the demand for the number of outpatient visits and the out-of-pocket expense for outpatient health services. Next, the degrees of difference between rural and urban areas are as follows: the observed probabilities of outpatient health services in rural and urban areas are 0.28 and 0.21, respectively, so the probability of outpatient health services of rural residents is higher than that of urban residents. But the standardized probabilities of outpatient visits in rural and urban areas are 0.23 and 0.20, respectively when I controlled intrinsic health need variables such as gender, age, and health status. Though this kind of difference decreased from 1.33 times to 1.14 times. The observed number of outpatient visits in rural and urban areas are 1.82 and 1.96, respectively, so the number of outpatient visit of rural residents is lower than that of urban residents. But the standardized number of outpatient visits in rural and urban areas are 1.72 and 1.54, respectively after I controlled intrinsic health need variables such as gender, age, and health status. So in terms of the observed number of outpatient visit, rural residents are lower than urban residents, but in terms of standardized number of outpatient visit, rural residents are higher than urban residents. The observed total outpatient out-of-pocket costs in rural and urban areas are 15,624 Won and 26, 537 Won, respectively, in which urban areas are 1.70 times higher than rural areas. But the standardized outpatient out-of-pocket costs in rural and urban areas are 14,111 Won and 19,776 Won, respectively in which the gap between them decreased slightly, but there is no opposite direction unlike the number of outpatient visits. From these kind results, there is inequity in outpatient health services. That is

more favorable inequity in rural areas than urban areas. Future research is also needed on assessment of the appropriateness of health service utilization they used though this kind of research is too difficult to deal with under current situation.

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Summary

의약분업 이후 도시와 농촌간 외래의료이용 차이의 계량적인 분석

吳 泳 昊

이 연구는 2001 국민보건의료실태조사자료를 사용하여 우리나라의 의료이용에 있어서 도시와 농촌간 비형평성이 존재하는지를 회귀분석접근법을 적용하여 평가하고 그 정도를 계량화하였다. 분석결과에 의하면 농촌이 도시보다 외래의료시장 진입과 외래의료이용량의 관점에서 유리한 비형평성이 존재하였다. 즉 같은 건강상태 하에서 농촌 주민이 도시주민보다 상대적으로 높은 의료이용을 보였으며, 반면 , 의료비는 상대적으로 낮았다. 그러나 이러한 결과로부터 도시의 외래의료이용을 증가시키거나 또는 농촌의 외래의료이용을 도시와 같은 수준으로 유지하기 위해 감소시키기 위한 보건정책을 수립해야 한다고는 결론지을 수는 없다. 왜냐하면 어느 정도의 의료이용이 적정수준인지 또는 도시와 농촌의 의료이용 중 어느 것이 적정한지를 알 수 없기 때문이다. 이러한 문제에 대한 해답은 의료이용의 적정성 평가를 통해서 가능하며, 이 적정성 평가는 본 연구의 범위 밖으로 다루지 않았다.