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Horizontal Equity in Health Care Utilization in South Korea

: by level and type of care

의료기관 종별에 따른 의료이용의 수평적 형평성 분석

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Abstract

Background

In South Korea, given high out-of-pocket payments and steep competition among health care providers, there has been growing concerns on access to health care, financial risk protection, and inefficient health care delivery. To tackle these problems, a series of health policies intended to reduce high out-of-pocket payments have been implemented since the late 2000s. Therefore, research on addressing the impact of those health policies needs to be carried out.

Objective

The purpose of this paper is to measure and explain income-related horizontal inequity in the delivery of health care in South Korea after the late 2000s, employing the concentration indices and the horizontal inequity index proposed by Wagstaff and van Doorsaler(the HIwv index) based on a one-and two-part model.

Methods

This study was conducted using data from the 2010 Korean National Health and Nutrition Examination Survey(KNHANES). We ranked individuals by the logarithm of monthly income per equivalent adult. Health care utilization consists of outpatient care, inpatient care, and medical expenditure; the level and type of health care were distinguished into health centers, clinics, hospitals, general hospitals, dental care, and licensed traditional medical practitioners. For need variables, age, gender, self-assessed health, the number of chronic diseases, and activity limitation due to any health problems were used. We included non-need variables such as education, economic activity, region, medicaid status, and private insurance. To assess income-related inequality and horizontal inequity in health care use, the concentration indices and the HIwv indices were obtained.

Results

The results provide some evidence of the equitable distribution of overall health care utilization with pro-poor tendencies and of modest pro-rich inequity in the positive medical expenditures, which is

consistent with the Korean literature. With regard to the decomposition analysis, although need factors are important, non-need variables, particularly income, education, private insurance, and occupation status, are more important and substantially contribute to pro-rich inequality in health care. For outpatient care, the disadvantaged in South Korea are less likely to have access to primary care, showing a more pro-rich tendency aggravated over time; there is a pro-poor pattern in the use of secondary care, indicating that access to such care for the poor is improved. Once access to care is made, they tend to be treated equally according to their needs. But for secondary care, a more pro-rich pattern than that of access to care seems to appear. In addition, there is evidence of a socio-economic gradient in health care utilization. That is, the better-off tend to use sophisticated services in a hospital more frequently; the worse-off tend to have a visit to a health center more often, to which education effects contribute. For inpatient care, access to care is pro-poor, while pro-rich tendencies appear in the number of inpatient stays for the use of clinics and general hospitals. Furthermore, the worse-off are more likely to have expenditure on health care because of their higher need. But small pro-rich inequity in the positive medical expenditure due to the contributions of income and education indicates the better-off may be able to enjoy more expensive and good quality of services in the health system.

Conclusions

We find the degree of horizontal inequity in health care in South Korea is fairly equitable, and policies for reducing out-of-pocket payments since the late 2000s have worked in some ways by improving access to secondary care for the disadvantaged. But the poor still have some barriers to access to primary care and to continuing to receive medical care. Therefore, there needs to be relevant policies to tackle these problems.

Keywords : Two-part model, Horizontal inequity, Income-related inequality, Health care utilization, Health care expenditure, South Korea

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Ⅰ. Introduction

A. Research Background

The majority of high-income countries have strived to achieve universal health coverage, which comprises of universal population coverage, comprehensive benefit coverage, and reducing cost sharing(Stuckler, Feigl et al. 2010). Although universal health coverage is understood in various ways, the primary definition of it used by WHO is: "universal coverage is defined as access to key promotive, preventive, curative, and rehabilitative health interventions for all at an affordable cost, thereby achieving equity in access."(Stuckler, Feigl et al. 2010) In most countries, equal access to health care services is a primary goal for universal health coverage; and solidarity in health care, the prime principle of universal health coverage, implies "no rationing by price"(Cutler 2002).

However, as medical expenditure has increased rapidly over time owing to the development of medical technologies and rising individuals' willingness to pay accompanied by economic development, many countries have been concentrating on cost containment in their health care reforms. As a result, the equity and efficiency balance issue has cropped up in health care(Cutler 2002).

The same held true for South Korea, where social health insurance was first introduced in 1977. Through rapid economic growth, universal population coverage was rapidly achieved in 1989 at the expense of limited benefit coverage; benefit coverage has also been extended as time goes by(Kwon 2007;

Lu, Leung et al. 2007; Jones 2010).

Before we discuss health care utilization in South Korea, it would be useful to understand the health care system in South Korea. The National Health Insurance(NHI), a public non-profit organization, provides an extensive benefit package which covers outpatient care as well as inpatient care including traditional medicine(Lu, Leung et al. 2007). For inpatient care, the co-payment rate is fixed by 20%. As far as outpatient care is concerned, co-payment rates are in the range between 30% and 60%(Jones 2010). The Koreans are paying the highest co-payment rate among the 20 Organization for Economic Cooperation and Development(OECD) countries where co-payments need to be paid; and a proportion of out-of-pocket payments is high as 35% in national health expenditure(Jones 2010). In 2008, most people, about 76%, possessed supplemental private insurance for covering high co-payments and uninsured services(Jones 2010). The reimbursement for health care providers is based on a fee-for-service basis. Health care providers tend to maximize profits by introducing high-technology but uninsured services(Lu, Leung et al. 2007). More than 90% of hospitals and clinics are run by private owners and provide services that are not reimbursed by NHI at high prices(Jones 2010). Furthermore, steep competition occurs between hospitals with large outpatient centers and clinics with inpatient facilities(Lu, Leung et al. 2007).

Therefore, given high out-of-pocket payments and steep competition among health care providers, there has been growing concerns on access to health care, financial risk protection, especially for lower income households, and inefficient health care delivery(Kwon 2007; Jones 2010). To tackle these problems, the government has made constant

efforts to lower out-of-pocket payments, especially pronounced since the late 2000s. There has been a series of health policies which are setting maximum out-of-pocket payment limits favoring low-income groups as of January in 2009 and the reduction of co-insurance rates from 10% to 5% for those who have cancer as of December in 2009 and for cardio-vascular disease patients as of January in 2010(Korea Ministry of Health and Welfare 2012). And consequently, those health policies might have had an influence on increasing access to health care.

In this paper, we gauge income-related horizontal inequity in the delivery of health care in South Korea after the late 2000s based on the principle of "equal treatment for equal need, i.e. persons in equal need should be treated equally regardless of their income"(van Doorslaer and Wagstaff 1992; van Doorslaer and Masseria 2004), which can be measured by the horizontal inequity index proposed by Wagstaff and van Doorslaer(2000). Since then, many attempts have been made to revolve around the measurement and testing the HIwv index. Meanwhile, Pohlmeier and Ulrich(1995) contributed to the study of the two-part decision making process which is divided into patient-driven decision(an initial contact) and doctor-driven decision(subsequent visits). A vast of recent literature has now been considering the two-part decision making process, the decomposition approach, and non-need variables(van Doorslaer, Koolman et al. 2004; van Doorslaer and Masseria 2004; Leu and Schellhorn 2006; Lu, Leung et al. 2007; Crespo-Cebada and Urbanos-Garrido 2012).

In terms of studies in South Korea, much research was inclined to examine income-related inequity in medical care use by sub-groups: by age group, by disease, by region, etc. Despite

the plenty of research on horizontal inequity in health care utilization, there is a relative paucity of research on horizontal inequity by level and type of care. Furthermore, little is understood about the two-part decision making process, the decomposition method, and non-need variables.

This paper updates the evidence on horizontal inequity in health care utilization in South Korea in several respects. First, we quantify and explain horizontal inequity in health care use by level and type of care in South Korea, employing a one-part and two-part model. In this paper, we compare the result of the one-part model with those of the two-part model, which would show the relative impacts among them. The mechanism of relative impacts may differ by level and type of care. Therefore, it would be helpful to examine horizontal inequity in health care by level and type of care. Secondly, we gauge horizontal inequity in medical care use after the late 2000s. A series of health policies intended to reduce high out-of-pocket payments have been implemented since that time. Therefore, research on addressing the impact of those health policies needs to be carried out. In fact, there are two articles about horizontal inequity in health care by type of care using data after 2000. One is carried by Rhim and Lee(2010) who use data from the 2005 Korean National Health and Nutrition Examination Survey. The other is conducted by Choi(2012) who employs the 2008 Korean Health Panel, but there is an insufficient need adjustment issue which only age, sex, and the number of chronic disease are used as proxies for need. Moreover, the work does not consider non-need variables, generating omitted variable bias. Finally, we strive to overcome the methodological limitations of the Korean literature which gives little consideration to the decomposition approach, non-need variables, and a complex survey design.

B. Research Purpose

The purpose of this paper is to measure and explain income-related horizontal inequity in the delivery of health care in South Korea after the late 2000s, employing the concentration indices and the HIwv indices based on a one-and two-part model.

C. Research Hypotheses

The following hypotheses are among those to be tested in the paper:

(1) The probability of health care utilization will be pro-poor or equitable, and the number of health care use and medical expenditure will be pro-rich.

(2) With regard to horizontal inequity in health care by level of care, there will be a socio-economic gradient in health care utilization: while use of health centers will be pro-poor, a pro-rich distribution will be found as the level of care is higher.

(3) In terms of horizontal inequity in health care by type of care, the most pro-rich inequity will be found in visits to a dentist.

Ⅱ. Literature Review

A. Literature Review

This paper will be limited to horizontal inequity in medical care use measured by the concentration indices such as the HIwv indices. To provide a framework for our analysis, we will first review a body of literature that explores horizontal inequity in health care based on five criteria: (i) the scope of analysis, (ii) estimation methods, (iii) the decomposition method, (iv) dependent variables, i.e. health care variables, and (v) non-need variables consideration.

1. International Literature Review

With regard to the scope of analysis which includes a study design issue and the target population of study, the majority of studies employs a cross-sectional analysis approach(van Doorslaer and Jones 2004; van Doorslaer, Koolman et al. 2004; van Doorslaer and Masseria 2004; Morris, Sutton et al. 2005; Crespo-Cebada and Urbanos-Garrido 2012; Macinko and Lima-Costa 2012). On the other hand, a few examples using panel analyses are available. One is Allin et al.(2006) who employ a multiple random effects probit panel model for analyzing data from the British Household Panel Survey between 1997 and 2003. Another is Ourti(2004) who uses a Gaussian random effects two-part count data model for examining data from the panel study of Belgian households in the period 1994-2001.

Some explore horizontal inequity in health care utilization for cross-countries by comparing with the variations in the degree

of horizontal inequity(van Doorslaer, Wagstaff et al. 2000; van Doorslaer, Koolman et al. 2002; van Doorslaer and Jones 2004; van Doorslaer, Koolman et al. 2004; van Doorslaer and Masseria 2004; Lu, Leung et al. 2007); others provide the evidence on equity in health care use in a specific country(Van Ourti 2004; Morris, Sutton et al. 2005; Allin, Masseria et al. 2006; Gundgaard 2006; Leu and Schellhorn 2006; Crespo-Cebada and Urbanos-Garrido 2012; Macinko and Lima-Costa 2012). In general, the majority of research on horizontal inequity in health care use is focusing on the adult population and is analyzing by type and level of care such as a general practitioner, a medical specialist, dental care, and inpatient care. But there has been minimal research regarding sub-groups like the elderly. Notable exceptions are Allin et al.(2006) who explore horizontal inequity in health care use among the elderly in the U.K. and Crespo-Cebada and Urbanos-Garrido(2012) who research on income-related inequity in GP services use among older people in Spain.

In relation to estimation methods which contain the measurement of horizontal inequity like the HIwv indices and model specifications matters, as Ourti(2004) states, Le Grand(1978, quoted from Ourti 2004) first explored the distribution of health care. After that, the HIwvp index was proposed by Wagstaff, van Doorslaer, and Paci(1991), and Wagstaff and van Doorslaer(2000) introduced the HIwv index which is commonly employed to measure horizontal inequity in health care field(van Doorslaer and Jones 2004; van Doorslaer, Koolman et al. 2004; van Doorslaer and Masseria 2004; Van Ourti 2004; Leu and Schellhorn 2006; Lu, Leung et al. 2007; Crespo-Cebada and Urbanos-Garrido 2012; Macinko and Lima-Costa 2012).

A great number of articles measure horizontal inequity by using non-linear models such as a two-part model based on a probit/logit regression for the first stage and a zero truncated negative binomial model for the second stage or a zero-inflated binomial model(van Doorslaer, Koolman et al. 2004; Van Ourti 2004; Morris, Sutton et al. 2005; Allin, Masseria et al. 2006; Gundgaard 2006; Crespo-Cebada and Urbanos-Garrido 2012; Macinko and Lima-Costa 2012). Some use linear models(van Doorslaer, Masseria et al. 2006; Lu, Leung et al. 2007); others employ both the linear and non-linear models and compare the results with each other, concluding that the HI index is insensitive to model specifications(van Doorslaer, Wagstaff et al. 2000; Wagstaff and van Doorslaer 2000; van Doorslaer and Masseria 2004; Leu and Schellhorn 2006). In the meantime, since Pohlmeier and Ulrich(1995)'s attempt to distinguish between patient-initiated decision(an initial contact) and doctor-driven decision(subsequent visits) in health care utilization, recent research has been inclined to consider the two-part decision process while measuring horizontal inequity in health care(van Doorslaer, Koolman et al. 2004; van Doorslaer and Masseria 2004; Leu and Schellhorn 2006; van Doorslaer, Masseria et al. 2006; Lu, Leung et al. 2007; Crespo-Cebada and Urbanos-Garrido 2012).

With respect to the decomposition method, Wagstaff et al.(2003) show that based on a linear model specification, the total concentration index can be decomposed into the contribution of each determinant, and the decomposition method can be used to give an explanation of horizontal inequity in health care utilization. Now a great deal of recent research has been using the decomposition method and has been presenting the relative impact of explanatory variables on horizontal inequity in health care use(van Doorslaer, Koolman et al. 2004; van Doorslaer

and Masseria 2004; Allin, Masseria et al. 2006; Leu and Schellhorn 2006; Lu, Leung et al. 2007; Crespo-Cebada and Urbanos-Garrido 2012; Macinko and Lima-Costa 2012)

In terms of health care variables, there has been a vast literature on count data in health care such as visits to a doctor or inpatient days(van Doorslaer and Jones 2004; van Doorslaer, Koolman et al. 2004; van Doorslaer and Masseria 2004; Van Ourti 2004; Morris, Sutton et al. 2005; Allin, Masseria et al. 2006; Leu and Schellhorn 2006; Lu, Leung et al. 2007; Crespo-Cebada and Urbanos-Garrido 2012; Macinko and Lima-Costa 2012), but few studies on limited dependent variables, i.e. medical expenditures, have been made(van Doorslaer and Wagstaff 1992; van Doorslaer, Wagstaff et al. 2000; Wagstaff and van Doorslaer 2000; Gundgaard 2006). Despite some differences in the degree of horizontal inequity in health care utilization across countries studied, there has been a general trend to be drawn from previous studies. With regard to outpatient care use, a significant extent of income-related inequity favoring the rich emerges in visits to a medical specialist and a dentist. And there is an equitable or pro-poor distribution of visits to a general practitioner. For inpatient care and medical expenditure, although inconclusive, a pro-poor or equitable distribution is found in general.

Finally, as with non-need variables consideration, van Doorslaer et al.'s work(2002) lays the groundwork for elucidating horizontal inequity in health care by including non-need variables in the analysis. Furthermore, non-need factors took on renewed importance in several studies, claiming that the omission of these non-need factors might result in omitted variable bias(Gravelle 2003; Schokkaert and Van de Voorde 2004). Now it is generally taken for granted that non-need

variables should be included while measuring horizontal inequity in health care(van Doorslaer and Masseria 2004; Van Ourti 2004; Allin, Masseria et al. 2006; Lu, Leung et al. 2007; Crespo-Cebada and Urbanos-Garrido 2012; Macinko and Lima-Costa 2012). On the whole, some non-need variables, such as higher education and city residents, contribute to pro-rich inequity in health care utilization, especially in the use of a medical specialist and dental care.

2. Korean Literature Review

With respect to the scope of analysis, to our knowledge, there is no studies of horizontal inequity in health care utilization using a panel data analysis owing to the lack of available data source. The existing literature is using a cross-sectional analysis(Kwon, Yang et al. 2003; Shin and Kim 2006; Lu, Leung et al. 2007; Kim, Choi et al. 2008; Lee 2010; Rhim and Lee 2010; Kim, Shin et al. 2011; Lee and Park 2011; Choi 2012; Jeon and Kim 2012; Kim 2012a; Kim 2012b), most of which use data from the Korean National Health and Nutrition Examination Survey(KNHANES). Compared with the international literature, what is interesting from our point of view is that much attention was directed to the analyses of horizontal inequity in health care by sub-groups: by age groups(Kim, Choi et al. 2008; Lee 2009; Kim, Shin et al. 2011; Kim 2011a; Kim 2011b; Kim 2012b), by disease(Jeon and Kim 2012), by region(Kim 2012a; Kim 2012b), and by type and level of care(Kwon, Yang et al. 2003; Shin and Kim 2006; Lu, Leung et al. 2007; Rhim and Lee 2010; Choi 2012).

When it comes to estimation methods, compared with the international literature which the HI index is dominated to gauge horizontal inequity in health care, there has been roughly

two strands of methods used in South Korea: one is the Le Grand index(Lee 2005; Lee 2010; Lee and Park 2011; Kim 2011a; Kim 2011b), and another is the HIwv index which is apparently dominant(Kwon, Yang et al. 2003; Shin and Kim 2006; Lu, Leung et al. 2007; Kim, Choi et al. 2008; Rhim and Lee 2010; Kim, Shin et al. 2011; Choi 2012; Jeon and Kim 2012; Kim 2012a; Kim 2012b). There are a couple of things that are different from the international literature. One is almost all the research employs linear model specifications while measuring horizontal inequity. Another is many studies do not present statistical significance of the HI indices, except for Shin and Kim(2006), Lu, Leung et al.(2007), Kim et al.(2011), and Choi(2012). The other is much literature does not consider a survey design which affects the point estimates, standard errors, confidence intervals, and test statistics(O'Donnell, van Doorslaer et al. 2008), apart from Shin and Kim(2006) and Lu, Leung et al.(2007).

Meanwhile, in opposition to international research, fewer studies have attempted to employ the two-part decision making process. Though there are a few studies to distinguish between the probability of any visits and the number of visits(Lee 2010; Kim 2011b), they use the Le Grand index for measuring horizontal inequity in health care utilization. Moreover, only the indices do they present, and little mention of the two-part decision making process is made in interpreting the indices.

For the decomposition method, research on horizontal inequity in health care use has made small but notable strides toward discussing the decomposition method(Shin and Kim 2006; Lu, Leung et al. 2007; Rhim and Lee 2010; Kim, Shin et al. 2011).

In terms of health care variables, much research is devoted to

assessing count data, such as outpatient visits and inpatient days(Kwon, Yang et al. 2003; Shin and Kim 2006; Lu, Leung et al. 2007; Kim, Choi et al. 2008; Lee 2010; Rhim and Lee 2010; Kim, Shin et al. 2011; Choi 2012; Kim 2012a; Kim 2012b), and attention is also given to analyze medical expenditure(Kwon, Yang et al. 2003; Lee 2005; Kim, Choi et al. 2008; Kim, Shin et al. 2011; Kim 2011a; Kim 2011b; Choi 2012). By and large, after standardizing the need, there is a pro-poor or equitable distribution of overall outpatient visits, a licensed traditional medical practitioner visit, dental care, and inpatient days. Notably, there is a socio-economic gradient in the distribution of outpatient visits, which means that the better-off visit tertiary hospitals more often than the poor. Such results are fairly similar to the international evidence. In contrast to overseas examples, horizontal inequity favoring the rich in medical expenditure is found, which indicates that given similar need, the rich are spending more for health care than the poor.

Lastly, as with non-need variables consideration, there has been quite a bit of recent scholarly efforts to include non-need variables such as private insurance, medicaid status, region, marital status, education, and economic activity status(Shin and Kim 2006; Lu, Leung et al. 2007; Lee 2009; Rhim and Lee 2010; Kim, Shin et al. 2011). Of these studies, some consider non-need variables but do not decompose the estimated inequality in health care use into the contributions of horizontal inequity, so they fail to show the effects of non-need variables separately. According to the findings(Shin and Kim 2006; Lu, Leung et al. 2007; Kim, Shin et al. 2011), higher education, region, and non-participation in labor force have some roles in inequality in health care utilization, as seen in the international literature.

B. The Two-part Decision making process

Much has been written about the demand of health care and health care utilization. The useful insight of Pohlmeier and Ulrich(1995)'s approach came from their weaving of Grossman's model of the demand for health and health care, in which it is a patient who decides the demand for health care, with the principal-agent model, in which a doctor acts as the patient's agent who is hired to deliver health services on the patient's behalf. In short, they link these two different approaches to a one decision making process which is made of two parts.

They give a fully justified account of the two-part decision making process in health care utilization. For an initial contact which is a patient's decision to see a doctor, it is usually driven by the patient. And it can be assumed that it arises from the patient's utility maximization issue, which Grossman's(Grossman 1972, quoted from Pohlmeier and Ulrich 1995) model of the demand for health could elaborate(Pohlmeier and Ulrich 1995).

In terms of the second stage of the decision making process, many studies of health care use focus mostly on the principal-agent relationship between a doctor and a patient. It is the physician who decides the volume of health care services such as subsequent visits and referrals. However, the physician not only makes a decision on medical services based on medical criteria, but also has incentives to maximize his own utility(Pohlmeier and Ulrich 1995). It can be argued that the physician exerts his influence on patients and uses the

asymmetry of information "by setting strategic plans, like referrals, the wage rate, and the duration of service, to accomplish the best feasible solution from his point of view"(Pohlmeier and Ulrich 1995).

Furthermore, Pohlmeier and Ulrich(1995) provide the joint analysis of the discrete propensity of health care utilization and the two-part decision making process. The use of medical care can be distinguished by two characteristics. One is the discrete nature of health care use on data: the dependent variables used health care utilization studies, such as physician visits and medical expenditure, are known to have skewed distributions with zero mass(Pohlmeier and Ulrich 1995). Another is the two-part decision making process in the use of health care: at the first stage, i.e. the demand-side process indicating access to care, it is the patient who determines an initial contact, and at the second stage, i.e. the supply-side process, the physician mainly assesses the intensity of care(subsequent visits) for the patient's sake(Pohlmeier and Ulrich 1995).

Based on these features, they contend that decisions to make an initial contact and subsequent visits are different stochastic mechanisms and should be estimated separately; if not, it results in inconsistent estimated coefficients and misleading conclusions(Pohlmeier and Ulrich 1995). In terms of interpretation of the decision processes, even though the same independent variables can be used to explain for the two stages, the meanings of them can be different contingent on the stages(Pohlmeier and Ulrich 1995).

C. Measuring and Explaining Horizontal Inequity in Health care utilization

Our approach in this paper relies on the methods used by van Doorslaer et al.(2004) to quantify and explain inequity in health care utilization. We employ the concentration index and the HIwv index for quantifying the degree of income-related inequity in health care use(Kakwani, Wagstaff et al. 1997; O'Donnell, van Doorslaer et al. 2008). In order to understand the nature of horizontal inequity in health care, for a start, it is necessary to grasp the concentration index.

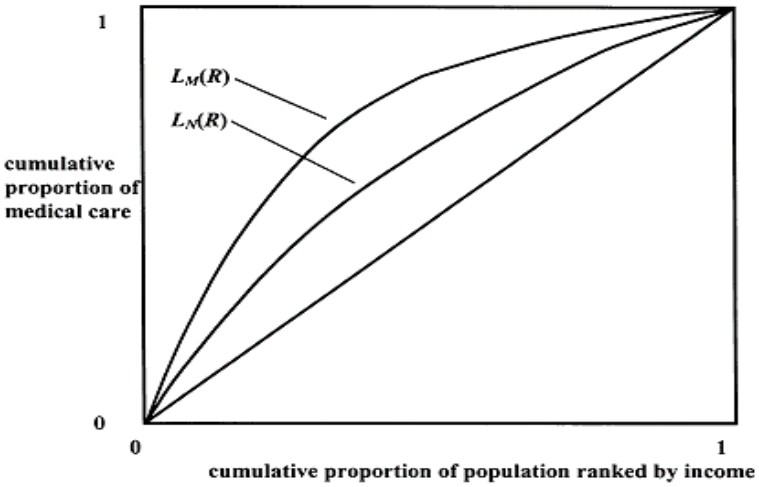
1. The Concentration Index

Wagstaff and van Doorsaler(2000) define the concentration index as "twice the area between the concentration curve and the line of perfect equality, i.e. the 45-degree line"(Wagstaff and van Doorslaer 2000).

$$\mathbf{C_M} = 1 - 2\int_0^1 \mathbf{L_M}\,(\boldsymbol{R})\mathbf{d}\boldsymbol{R} \quad , \qquad (1)$$

the index is bounded between -1 and 1. In the case of no income-related inequality, the concentration index is zero. If the index takes a negative(positive) value, it indicates pro-poor(pro-rich) inequality favoring the poor(the rich)(Wagstaff and van Doorslaer 2000; O'Donnell, van Doorslaer et al. 2008).

Figure 1. The Concentration Curve



Source : Wagstaff and van Doorslaer(2000)

For weighted data, we can obtain the concentration index by using a "convenient formula" proposed by Kakwani et al.(1997):

$$2\sigma_R^2\left(\frac{y_i}{\mu}\right) = \alpha + \beta R_i + \varepsilon_i \ , \qquad (2)$$

where μ is the sample mean of health care use(y). σ_R^2 is the weighted variance of the fractional rank(R_i). R_i is the fractional rank of the ith individual across income, which is defined as "$R_i = \sum_{j=0}^{i-1} w_j + \frac{w_i}{2}$, where W_i is the sampling weight of each individual i with the sum of W_i equal to the sample size. w_j denotes the sampling weight scaled to sum to 1 and $w_0 = 0$"(Kakwani, Wagstaff et al. 1997). The estimated coefficient($\hat{\beta}$) is equal to the concentration index, and the standard error of the concentration index is the same as the standard error of $\hat{\beta}$(Kakwani, Wagstaff et al. 1997; Wagstaff and van Doorslaer 2000; Leu and Schellhorn 2006; O'Donnell, van Doorslaer et al. 2008).

2. Measuring and Explaining Horizontal Inequity

Although the concentration index of the actual health care utilization($\mathbf{C_M}$) measures the extent of inequality in health care use by income, such inequality cannot be interpreted as inequity. This is because the poor tend to have worse health status and greater need for health care, thereby consuming more health care services. Therefore, to assess inequity, inequality in the use of health care must be standardized for differences in need. In a nutshell, the concentration index of the actual medical care use($\mathbf{C_M}$) gauges the degree of inequality; the concentration index of the need-standardized use, which is referred to as the horizontal inequity index, measures the extent of horizontal inequity in health care use(van Doorslaer, Koolman et al. 2004; van Doorslaer and Masseria 2004; O'Donnell, van Doorslaer et al. 2008).

Although both direct and indirect methods of need standardization could be used, this paper will be limited to the indirect standardization method, i.e. so called the HIwv index. The HIwv index produces a figure, through the indirect need standardization which gives consideration to "the amount of medical care she would have received if she had been treated like others with the same need were, on average, treated by the health system"(Wagstaff and van Doorslaer 2000).

Before looking more closely at the HIwv index, it would be useful to understand the indirect standardization process(O'Donnell, van Doorslaer et al. 2008). Think about a health care regression as follows:

$$\mathbf{y_i} = \boldsymbol{\alpha} + \sum_j \boldsymbol{\beta_j} \boldsymbol{x_{ji}} + \sum_k \boldsymbol{\gamma_k} \mathbf{Z_{ki}} + \boldsymbol{\varepsilon_i} \ , \qquad (3)$$

where $\mathbf{y_i}$ is health care use, and $\mathbf{i}$ represents an individual. $\boldsymbol{\alpha}$, $\boldsymbol{\beta}$, and $\boldsymbol{\gamma}$ are the coefficients of the regression. $\boldsymbol{\mathcal{X}_j}$ is need variables which need to be standardized, and $\mathbf{Z_k}$ is non-need variables which should not be standardized but neutralized. The need-expected values of the dependent variable($\widehat{\mathbf{y_i^X}}$) are obtained by means of the predicted estimates($\widehat{\boldsymbol{\alpha}}$,$\widehat{\boldsymbol{\beta}}_\mathbf{j}$, $\widehat{\boldsymbol{\gamma}}_\mathbf{k}$), actual values of the need variables($\boldsymbol{\mathcal{X}_{ji}}$), and sample means of the non-need variables($\overline{\mathbf{Z_k}}$):

$$\widehat{\mathbf{y_i^X}} = \widehat{\boldsymbol{\alpha}} + \sum_\mathbf{j} \widehat{\boldsymbol{\beta}}_\mathbf{j} \boldsymbol{\mathcal{X}_{ji}} + \sum_\mathbf{k} \widehat{\boldsymbol{\gamma}}_\mathbf{k} \overline{\mathbf{Z_k}} \ . \qquad (4)$$

And then values of the indirectly standardized health care($\widehat{\mathbf{y_i^{IS}}}$), are obtained by subtracting need-expected use from actual health care use and then adding the overall sample mean($\bar{\mathbf{y}}$),

$$\widehat{\mathbf{y_i^{IS}}} = \mathbf{y_i} - \widehat{\mathbf{y_i^X}} + \bar{\mathbf{y}} \ . \qquad (5)$$

Wagstaff and van Doorslaer(2000) propose the HIwv index, defined as "twice the area between actual and need medical care concentration curves". It can be computed by the difference between $\mathbf{C_M}$ and $\mathbf{C_N}$:

$$\text{HIwv} = 2\int_\mathbf{0}^\mathbf{1}[\mathbf{L_N(p)} - \mathbf{L_M(p)}]\ \mathbf{dp} = \mathbf{C_M} - \mathbf{C_N} \ , \qquad (6)$$

where $\mathbf{C_M}$ is the concentration index for actual health care use, and $\mathbf{C_N}$ is the concentration index for need-expected use. The HIwv index lies in the range from −2 to 2, and a positive(negative) value of the HIwv indicates horizontal inequity favoring the better-off(worse-off). A zero or insignificant value means no horizontal inequity(Wagstaff and van Doorslaer 2000; van Doorslaer, Koolman et al. 2004; van Doorslaer and Masseria 2004).

Furthermore, the HIwv index could be easily obtained by running a "convenient regression":

$$2\sigma_R^2\left(\frac{y_i}{\mu}-\frac{y_i^*}{\mu^*}\right) = \gamma + \delta R_i + \upsilon_i \ , \qquad (7)$$

where y_i denotes the actual amount of health care service received by individual i, and μ indicates the mean of y_i. y_i^* is the predicted value through the indirect standardization of y_i , and μ^* is the mean of y_i^*. The estimated coefficient(δ) of the fractional rank(R_i) is equal to the HIwv index, and a standard error of the HIwv index is identical with the standard error of the coefficient(Kakwani, Wagstaff et al. 1997; van Doorslaer, Wagstaff et al. 2000; Wagstaff and van Doorslaer 2000; van Doorslaer, Koolman et al. 2002).

Wagstaff et al.(2003) suggest that based on a linear regression model, the concentration index can be decomposed into the contributions of income-related inequality. According to them, the concentration index for a health care use variable(y) can be displayed like this:

$$C_M = \eta_r C_{\ln inc} + \sum_n \eta_n C_{x,n} + \sum_p \eta_p C_{z,p} + C_\varepsilon/\mu \ , \qquad (8)$$

where $C_{\ln inc}$, C_n, C_p are the concentration indices for the explanatory variables. η_n is the estimated use elasticity of each determinant n and so for η_r and η_p. The first term indicates the contribution of income to the total inequality, the second one is the contribution of the need factors, the third one is the contribution of the non-need variables, and the last one is the generalized concentration index of the error term(ε)(van Doorslaer, Koolman et al. 2004).

Ⅲ. Research Method

A. Data

1. Data Source

This study was conducted using data from the fifth wave of the Korean National Health and Nutrition Examination Survey(KNHANES) conducted by the Korean Center for Disease Control and Prevention in 2010. The KNHANES is a nationally representative survey using a standardized questionnaire that entails a personal interviewing of households and non-institutionalized individuals(Korea Centers for Disease Control Prevention 2010). The survey data have been annually collected since 2007 and are based on an independent rolling sampling survey which has a complex survey design; it deals with a comprehensive range of items such as demographics, life style risk factors, health status, housing, education, income, employment, and health care utilization(Korea Centers for Disease Control Prevention 2010). In this study, 6073 individuals aged 19 years and older were selected out of the total 8824 individuals in the survey.

2. Dependent Variables (Health care variables)

1) Outpatient visits

The actual utilization of outpatient visits in the survey was measured by the following question "during the past two weeks, how many times have you visited to a doctor/hospital/general hospital or a dentist or a licensed traditional medical

practitioner?". The level and type of outpatient care were distinguished into health centers, clinics, hospitals, dental care, licensed traditional medical practitioners(LTMPs), and general hospitals.

2) Inpatient days

Inpatient days was obtained by the question "during the past one year, how many days have you spent on being admitted to a hospital?". The level of inpatient care was classified into clinics, hospitals, and general hospitals. Dental care and LTMPs care were excluded because of small sample size.

3) Medical expenditure per use(or day)

Medical expenditures per use(or day) divided into two parts, i.e. outpatient expenditure and inpatient expenditure during the respective reference period and were calculated separately by level and type of care. The question for measurement of medical expenditure was "during the past two weeks(one year), how much have you paid for outpatient visits(inpatient days)?". The medical expenditure included only costs for utilizing medical facilities and did not count travel cost, time cost, carer allowance, and prescription medicine fees. We employed the logarithm of the positive medical expenditure in the second stage of the two-part model in order to make its skewed distribution become a normal distribution satisfying the OLS regression premise.

3. Explanatory Variables

1) Income

The KNHANES income measure was self-reported annual disposable gross household income including wage, private non-labor income, pensions, and other direct government subsidies during the past one year. Annual household income was transformed into monthly income per equivalent adult employing the square root equivalence scale, which divides household income by the square root of family size. The method takes economies of scale in consumption into account, and it was used in recent OECD publications(OECD 2008). The result computed by using the square root scale is not that different from that of the OECD-modified scale which is commonly used in measuring horizontal inequity in health care utilization(OECD,http://www.oecd.org/social/familiesandchildren/35411111.pdf). We ranked individuals by the logarithm of monthly income per equivalent adult.

2) Need variables

For need adjustment, age, gender, self-assessed health status, chronic conditions, activity limitation status, disability status, and so on, are widely employed to obtain the need-predicted health care use. In this paper, we considered age, gender, and health need factors.

First of all, age and gender were considered. Age was assessed at the time of the interview and was split as follows: 19-34, 35-44, 45-64, 65-74, and 75 and over. Nine age-gender interaction terms dummy variables were employed.

For health need factors, Blaxter(1989) distinguishes between:

(i) a medical model, in which ill-health is identified from the point of view of the deviation from physiological normality like chronic illnesses; (ii) a functional model, in which ill-health is regarded in

terms of a lack of capability to fulfill normal tasks or roles such as activity limitation status; and (iii) a subjective model, in which ill-health is considered with regard to the individual's perception like self-assessed health(Blaxter 1989; van Doorslaer and Wagstaff 1992; O'Donnell, van Doorslaer et al. 2008).

In the light of this perspective, we used four dummy variables for self-assessed health, four dummy variables for the number of chronic diseases, and one dummy variable for the presence of activity limitation to proxy health care need.

Measurement of self-assessed health status was from the wording "how is your health in general?", which rated in five categories: "very good, good, fair, poor, and very poor". It is worth noting that Kakwani et al.(1997) and van Doorslaer et al.(2000) reveal the self-assessed health variable has greater impacts on the HIwv indices than any other variables(Kakwani, Wagstaff et al. 1997; van Doorslaer, Wagstaff et al. 2000).

In terms of the number of present chronic diseases which were self-reported, respondents were asked to tick the pertinent heading based on classified chronic conditions listed on the questionnaire. 29 chronic illnesses were distinguished in the fifth wave. Five categories for the number of chronic health problems were used: one, two, three, more than four, and zero otherwise.

The other need variable was the presence of activity limitation, and the related health question was "are you hampered in your daily activities by any physical or mental health problems or disability?". We used a dummy variable coded as "yes=1" or zero otherwise.

3) Non-need variables

To avoid omitted variable bias, it seems reasonable to include non-need variables such as education, private insurance, economic activity, and region. We considered non-need variables that are known to be correlated with the use of medical care. We included education and occupational status, which are related to disposition of seeking medical care help(van Doorslaer and Masseria 2004). Moreover, region of residence was used as a proxy for availability of care and competition among doctors(van Doorslaer and Masseria 2004). Furthermore, medicaid status(medical assistance for lower income groups) and private insurance were considered as a proxy for the purchase price of medical care(van Doorslaer, Koolman et al. 2002; van Doorslaer and Masseria 2004; Lu, Leung et al. 2007).

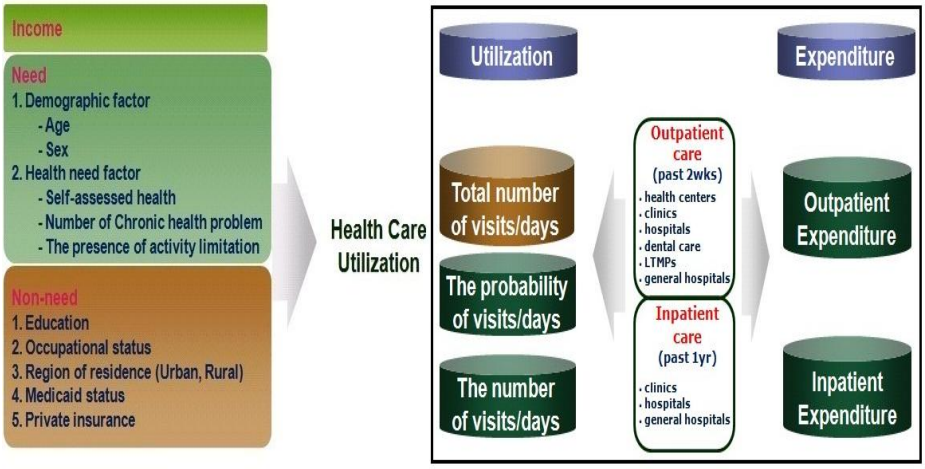
Educational attainment was distinguished into four categories, which were below elementary school, middle school, high school, and over college. An occupational status dummy variable was coded as "the unemployed=1" or zero otherwise. For region of residence, in the case of an individual living in a city, i.e. a resident of an administrative division 'dong', it was coded as one or zero otherwise. If one has the medicaid status, it was coded as one or zero otherwise. Furthermore, holding private insurance was indicated as one or zero otherwise.

The reference categories were male aged 19-34, self-assessed health status "very good", having no chronic disease, no activity limitation status, below elementary school education, the employed, rural residents, no medicaid status, and not holding private insurance.

B. Research Design

Having provided the explanation of data and variables, it would be helpful to present our research design in a figure in order to sum up. The research design can be conceptualized according to Figure 2.

Figure 2. Research Design



C. Estimation Methods

In general, because of the intrinsic non-linearity, a multitude of non-linear specifications have been used to measure horizontal inequity and inequality in health care utilization(van Doorslaer, Koolman et al. 2002; Ohkusa and Honda 2003; van Doorslaer, Koolman et al. 2004; Van Ourti 2004; Morris, Sutton et al. 2005; Allin, Masseria et al. 2006; Gundgaard 2006; Shin and Kim 2006; Macinko and Lima-Costa 2012). But the non-linearity property makes the decomposition method, which is important part of explaining horizontal inequity in health care, more complicated and inconsistent, since the decomposition approach holds for a linear model(O'Donnell, van Doorslaer et al. 2008).

However, van Doorslaer et al.(2000) have shown that the measurement of horizontal inequity little differs between OLS-based two-part models and non-linear two-part specifications using a logistic model combined with a negative binomial model, indicating that the HI indices are insensitive to model specifications(van Doorslaer, Wagstaff et al. 2000; Wagstaff and van Doorslaer 2000; van Doorslaer and Masseria 2004). Therefore, we have chosen a pragmatic approach using the OLS-based two-part model which combines a linear probability model for the probability of health care utilization and any expenditure and an OLS regression for the positive values, i.e. subsequent visits and (log)positive medical expenditures. In addition, we employ the OLS-based one-part model for total number of health care use including all observations, which is commonly used to explore horizontal inequity in health care use in the Korean literature. And then we compare the result of the one-part model with those of the two-part model. In order to assess income-related inequality and inequity in health care use, the concentration indices and the HIwv indices were obtained by using a "convenient regression"(Kakwani, Wagstaff et al. 1997; Wagstaff and van Doorslaer 2000; O'Donnell, van Doorslaer et al. 2008).

Moreover, sample weights were applied to obtain unbiased estimates of the concentration indices and the HIwv indices and their correct standard errors. Furthermore, since the data used in this study were collected by a complex sampling design, the data may suffer from within-cluster correlation and heteroscedasticity. To tackle these problems, robust standard errors were calculated by using the Huber-White estimator. All the estimates were obtained using STATA 12.0.

Ⅳ. Results

A. General Characteristics of the Study sample

The general characteristics of the study sample(N=6073) used in the analysis are given in Table 1. Of 6073 individuals, the population is separated evenly down the gender line, with 49.4% males and 50.6% females. The average monthly income per equivalent adult was 2,244,000 Korean won(1$=1,200 Korean won), and that of males was higher than that of females. The average age of the sample population was 45.1 years old, and that of females was a little bit older than that of males. 19.1% of the sample described their self-assessed health as bad(related categories were "poor" and "very poor"), and that of women was much worse(24.2%) compared with that of men(16.5%). 36% of the population reported that they had at least one chronic disease, and 12.12% of the individuals complained about activity limitation due to any health problems. 25.5% of the sample completed below elementary school level; the completion of over college was 30.6%. And females were more likely to have fewer years of formal education than males. The percentage of the unemployed was 40.1%; the proportion of women(52.5%) was higher than that of men(23.7%). The majority of the population lived in a city(78%), and the percentage of holding the medicaid status was 2.5%. Finally, most people had private insurance(72%).

Overall, women were more likely to be the disadvantaged with lower income, a low education, the unemployed, and holding the medicaid status. Moreover, they tended to be older and to have more health care needs.

Table 1. General Characteristics of the Individuals (N=6073)

	Total		Males		Females	
	N	%	N	%	N	%
	Mean(SD)		Mean(SD)		Mean(SD)	
Total	6073	100	2626	49.4	3447	50.6
Income*	224.4 (12.47)		234.2 (15.24)		214.8 (10.50)	
Age	45.1 (0.45)		44.2 (0.52)		45.9 (0.48)	
19-34	1244	20.48	488	18.58	756	21.93
35-44	1316	21.66	601	22.89	715	20.74
45-64	2182	35.93	937	35.68	1245	36.12
65-74	926	15.25	425	16.18	501	14.53
75+	405	6.7	175	6.7	230	6.7
Self-assessed health						
very good	294	4.8	150	5.73	144	4.2
good	1852	30.5	890	33.89	962	27.9
fair	2657	43.75	1152	43.87	1505	43.66
poor	1063	17.55	383	14.58	680	19.73
very poor	207	3.4	51	1.93	156	4.51
The number of chronic disease	0.5 (0.02)		0.4 (0.02)		0.6 (0.03)	
0	3887	64	1730	65.88	2157	62.58
1	1195	19.67	549	20.91	646	18.74
2	615	10.13	225	8.57	390	11.31
3	238	3.9	79	3	159	4.61
4+	138	2.3	43	1.6	95	2.76
Activity limitation						
yes	736	12.12	266	10.13	470	13.64
no	5337	87.88	2360	89.87	2977	86.36
Education attainment						
below elementary school	1547	25.47	460	17.52	1087	31.53
middle school	665	10.95	321	12.22	344	10
high school	2001	32.95	917	34.92	1084	31.43
over college	1860	30.63	928	35.34	932	27.04
Occupational status						
unemployed	2433	40.06	623	23.72	1810	52.51
employed	3640	59.94	2003	76.28	1637	47.49
Region of residence						
city	4730	77.89	2037	77.57	2693	78.13
rural	1343	22.11	589	22.43	754	21.87
Medicaid status						
yes	154	2.5	43	1.6	111	3.2
no	5919	97.5	2583	98.4	3336	96.8
Private insurance						
yes	4372	72	1881	71.6	2491	72.3
no	1701	28	745	28.4	956	27.7

* : 10,000 Korean won(1$=1,200 Korean won). SD stands for Standard Deviation.

Table 2 shows the features of health care utilization of the study sample. With respect to outpatient care utilization, 31.5% of the sample was likely to see a doctor during the past two weeks, and not surprisingly, females were more likely to visit a medical facility. For at least one visit, the average number of health care use was 1.84 visits(1.82 visits for males and 1.97 visits for females). And it seems to be reasonable that the sample tended to use primary care like clinics and licensed traditional medical practitioners(LTMPs) more often than secondary care like general hospitals. The population visited LTMPs more frequently than any other types of care(2.31 visits), especially for women(2.36 visits). On the other hand, men used hospitals more often than any other types of care(2.23 visits).

In relation to medical expenditure per use, the average outpatient expenditure per use was 32,710 Korean won, hereafter 'Kw', (43,167 Kw for males and 34,409 Kw for females), and the most expensive cost paid for dental care(236,839 Kw for males and 173,040 Kw for females), followed by general hospitals(64,462 Kw). There is a sort of a fee gradient among level and type of care, which seems acceptable in the light of the differential co-payment rates by level of care. Significantly, men paid more for hospitals, dental care, and LTMPs, where were most often visited; women paid more for health centers, clinics, and general hospitals, most pronounced for a general hospital(83,234 Kw, compared with 38,784 Kw for men).

In terms of inpatient care utilization, 11% of the population had a chance of hospitalization during the past one year, and it was women who tended to be more hospitalized(11.8%). The average number of inpatient stays(at least one day) was 13.8

days(17.2 days for men and 11.66 days for women). Notably, men stayed much longer at the majority of levels of hospitals, especially pronounced at clinics(18.55 days).

As for medical expenditure, the average inpatient expenditure per day was 217,524 Kw(275,739 Kw for males and 183,310 Kw for females), and the highest cost paid for general hospitals for both gender(329,044 Kw for males and 224,364 Kw for females). And men paid more for most levels of care than women. There is also a kind of a cost gradient by level of care, which is similar to outpatient care counterparts.

In sum, women used outpatient care utilization slightly more often, while men paid outpatient care expenditure per visit more. Meanwhile, men used inpatient care utilization more frequently and paid inpatient care cost per day more. These results seem highly probable on the grounds that women were inclined to see a doctor more often dealing with their health needs and concerns and to be the lower socio-economic population.

Table 2. Health Care Utilization

	Total		Males		Females	
	N	%	N	%	N	%
	Mean(SD)		Mean(SD)		Mean(SD)	
*Outpatient care utilization**						
Probability of visits	2130	35.1	798	30.4	1332	38.6
Average number of visits	1.84 (0.046)		1.82 (0.057)		1.97 (0.049)	
Health centers	1.23 (0.086)		1.33 (0.192)		1.17 (0.08)	
Clinics	1.77 (0.043)		1.64 (0.066)		1.83 (0.056)	
Hospitals	1.77 (0.115)		2.23 (0.284)		1.56 (0.1)	
Dentists	1.55 (0.057)		1.59 (0.093)		1.53 (0.071)	
LTMPs †	2.31 (0.129)		2.22 (0.205)		2.36 (0.0165)	
General hospitals	1.24 (0.047)		1.23 (0.075)		1.25 (0.058)	
*Inpatient care utilization***						
Probability of hospitalization	666	11	259	9.9	407	11.8
Average number of inpatient days	13.8 (0.81)		17.2 (1.634)		11.66 (0.801)	
Clinics	12.01 (1.84)		18.55 (4.717)		8.49 (1.1)	
Hospitals	13.49 (1.431)		16.68 (3.364)		11.89 (1.324)	
General hospitals	13.572 (0.99)		16.07 (1.782)		11.68 (1.084)	
*Medical Expenditure****						
Outpatient expenditure per use	32,710 (4,376)		43,167 (11,979)		34,409 (3,995)	
Health centers	1,875 (316)		1,774 (496)		1,930 (410)	
Clinics	13,579 (2,086)		10,913 (1,830)		15,016 (3,038)	
Hospitals	32,759 (5,832)		37,014 (13,914)		30,876 (5,779)	
Dentists	199,331 (49,578)		236,839 (100,777)		173,040 (46,405)	
LTMPs †	39,804 (10,757)		43,155 (22,390)		38,075 (11,581)	
General hospitals	64,462 (12,945)		38,784 (6,331)		83,234 (21,807)	
Inpatient expenditure per day	217,524 (31,202)		275,739 (80,193)		183,310 (15,193)	
Clinics	136,436 (19,056)		149,901 (43,968)		132,171 (21,073)	
Hospitals	136,592 (12,462)		163,146 (30,182)		124,790 (11,957)	
General hospitals	269,179 (53,336)		329,044 (119,448)		224,364 (26,685)	

* : During the past two weeks. ** : During the past one year. *** : 1 Korean won (1$=1,200 Kw).
† : LTMPs stands for Licensed Traditional Medical Practitioners. SD stands for Standard Deviation.
Notes: The number of people using outpatient care, i.e. health centers, clinics, hospitals, dentists, LTMPs, and general hospitals, is 136, 1325, 177, 265, 202, and 261, respectively. The number of people using inpatient care, i.e. clinics, hospitals, and general hospitals, is 120, 213, and 360, respectively.

B. Measuring Inequality and Inequity in Health care

The results of measuring inequality, i.e. the concentration indices of the actual use, and inequity, i.e. the HIwv indices of health care utilization after controlling for needs, are summarized by level and type of care in Table 3. Furthermore, these are divided into three parts based on the two-part decision process of the two-part model and the one-part model, which yield further insight into how the utilization patterns differ in the stages of the decision process. Statistically significant indices are pointed out in bold.

Table 3. Income-related Inequality and Inequity in Health Care Utilization

	Two Part Model				One Part Model	
	Probability		Number✝		Total	
	CM	HI	CM	HI	CM	HI
Outpatient care utilization*	**−0.0638**	0.0006	−0.0409	−0.0094	**−0.1047**	−0.0135
Health centers	**−0.3517**	−0.1268	−0.0282	−0.0222	**−0.3799**	−0.1333
Clinics	**−0.0677**	0.002	**−0.042**	−0.0052	**−0.1094**	−0.0101
Hospitals	**−0.1349**	−0.0952	−0.0139	0.0543	**−0.1488**	−0.0818
Dentists	0.0788	0.067	−0.0525	**−0.059**	0.0263	0.0094
LTMPs †	−0.026	0.0489	−0.028	0.0342	−0.054	0.0555
General hospitals	**−0.1588**	−0.0664	−0.0124	−0.0044	**−0.1712**	−0.0855
Inpatient care utilization**	**−0.0695**	−0.0260	−0.0429	−0.0458	−0.1123	−0.0589
Clinics	−0.0254	−0.0445	0.0843	0.0911	0.0589	0.0359
Hospitals	−0.0208	0.0274	−0.1173	−0.0839	−0.124	−0.1103
General hospitals	**−0.1288**	−0.0595	−0.0433	0.013	**−0.1722**	−0.0584
Medical Expenditure						
Outpatient expenditure per use*	**0.0053**	0.0025	**0.0156**	**0.0088**		
Health centers	**−0.2169**	−0.1585	0.0101	0.0007		
Clinics	**−0.0705**	−0.0018	**0.0154**	0.0126		
Hospitals	−0.1204	−0.0753	**0.0194**	**0.0297**		
Dentists	0.0821	0.0817	0.0063	**0.0152**		
LTMPs †	−0.035	0.0324	**0.0245**	**0.0144**		
General hospitals	**−0.1057**	−0.0375	−0.0006	0.0036		
Inpatient expenditure per day**	−0.0558	−0.0065	**0.0051**	**0.0076**		
Clinics	−0.0493	−0.0749	0.0048	0.0035		
Hospitals	−0.0129	0.0479	0.0044	0.0019		
General hospitals	**−0.0812**	−0.0142	0.0063	**0.0088**		

Significant indices in bold ($p<0.05$). ✝ : At least one visit/day.
* : During the past two weeks. ** : During the past one year.
† : LTMPs stands for Licensed Traditional Medical Practitioners.
Notes : The logarithm of the positive medical expenditure in the second stage of the two-part model was employed.

1. Outpatient care utilization

All the concentration indices of the actual use for the probability of any visits, the number of visits, and total number of visits are negative, except for dental care which is only negative in the subsequent visits. Although the majority of the indices for the probability of any visits are statistically significant, most of them turn out to be insignificant in the second stage of the decision process. And consequently, as with the one-part model, the indices are significant, which are influenced by the probability of any visits. Apart from dental care and LTMPs, negative and significant concentration indices for the probability of any visits indicate that the worse-off are more likely to see a doctor than the better-off, pronounced for health centers utilization. And the insignificant indices for dental care and LTMPs mean there is no inequality in access to such care. With regard to the conditional visits(at least one visit), all the indices is negative and insignificant, which means there is no inequality in actual frequency of visits, except for clinics which shows significant pro-poor inequality. The negative and significant index for visits to a clinic shows the poor tend to use it more often than the rich.

But the disproportionate use distribution of the actual outpatient care cannot be interpreted as inequity, since the poor are inclined to have greater health care needs than the rich(van Doorslaer and Masseria 2004). After need (indirect) standardization, most HIwv indices turn out to be negative but not significantly different from zero for the probability of, the conditional number of, and total number of visits. With respect to access to care use, half of the HIwv indices are negative and insignificant for health centers, hospitals, and general hospitals; the others are positive and insignificant for clinics, dental care,

and LTMPs. Even though insignificant indices indicate there is no inequity in medical care use, we need to examine the direction and magnitude of inequity. Particularly, access to health centers(−0.1268) is most pro−poor, followed by a hospital(−0.0952) and a general hospital(−0.0664), which depicts the worse−off are more likely to seek such care given the same need. The HIwv indices with the 95% confidence intervals for the probability of any visits are presented in Figure 3−1.

With regard to the subsequent visits, compared with the likelihood of any visits, income−related inequity is less pro−poor for health centers, hospitals, and general hospitals and more pro−poor for overall utilization, clinics, dental care, and LTMPs. All the HIwv indices for the likelihood of any visits are insignificant, except for dental care which is significant pro−poor(−0.059), meaning that the poor tend to use it more frequently. In general, for the second stage of the decision process, the population was treated equitably given equal need. But remarkably, we can see a pro−rich pattern for hospitals and LTMPs, which means the better−off tend to utilize them more often, although health need for such care is greater among the worse−off. Supposedly, it might be associated with the preference of the rich and some services induced by doctors. The indices with the 95% confidence intervals for the second stage of the decision process are shown in Figure 3−2.

The HIwv indices for the probability of, the number of, and total number of overall outpatient care utilization are 0.0006, −0.0094, and −0.0135. The HIwv indices for total visits of outpatient care with the 95% confidence intervals are presented in Figure 3−3. On the whole, except for clinics and overall outpatient visits, the probability of any visits has a greater

impact on total number of visits mainly leading to pro-poor inequity than the number of visits, which means that the disproportionate distribution of an initial contact primarily leads to horizontal inequity in the overall outpatient care use.

It is worth mentioning that the HIwv indices for dental care and LMTPs are somewhat positive, insignificant, though, in the stages of the demand-side process. This indicates that no inequity in the likelihood of such care use is found, but there is a tendency that the better-off are more likely to report visits to such care. On the other hand, in the stage of the supply-side process, the HIwv index for LTMPs is insignificant and less pro-rich than in the first stage. Although it shows that all income groups utilize equal amounts of such care given the same need, there is an inclination for the better-off to tend to use it more. For dental care, however, there is significant pro-poor inequity, indicating that the poor tend to visit a dentist more often given similar need. Although we find that there is no inequity in the distributions of both dental care and LTMPs for total number of visits, pro-rich tendencies appear(0.0094 for dental care and 0.0555 for LTMPs). Supposedly, this would be associated with low access to such care for the disadvantaged because of high out-of-pocket payments and the preference of the rich, which results in a pro-rich pattern.

Figure 3-1. Inequity Indices(HIwv) for the Probability of Outpatient Care(with 95% confidence intervals)

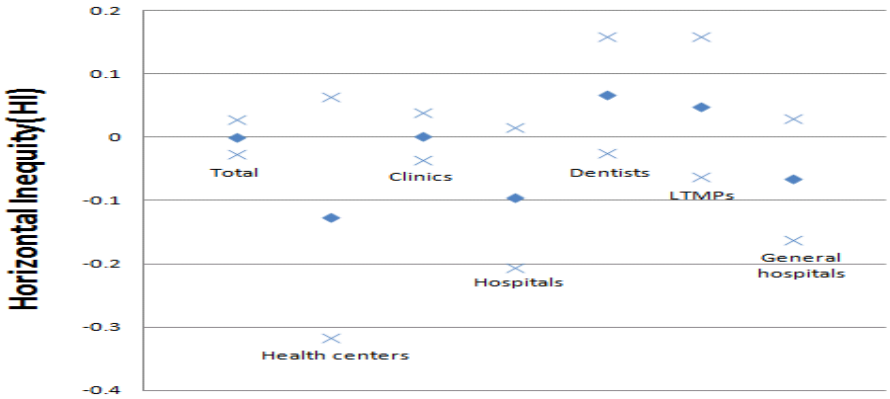


Figure 3-2. Inequity Indices(HIwv) for the Number of Outpatient Care(with 95% confidence intervals)

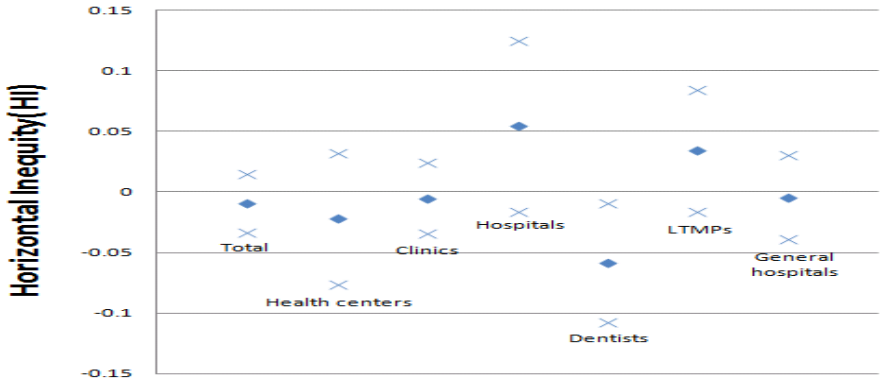
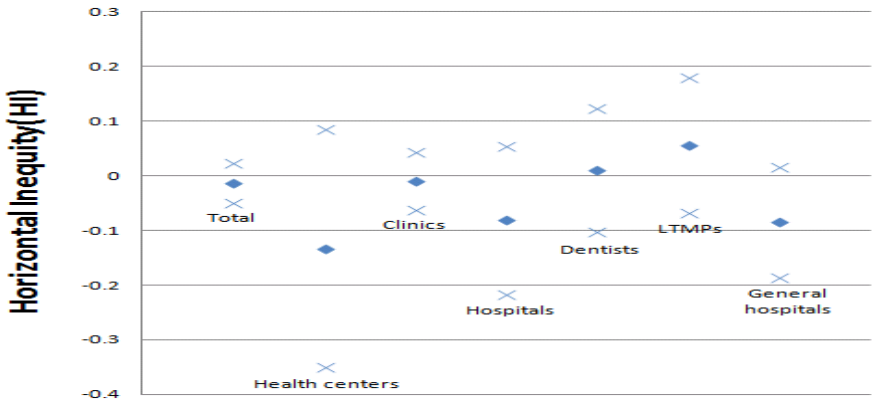


Figure 3-3. Inequity Indices(HIwv) for Total visits of Outpatient Care(with 95% confidence intervals)



2. Inpatient care utilization

All the concentration indices of the actual inpatient care utilization are negative, except for the number of and total days at clinics, and insignificant, except for general hospitals and overall inpatient care use. For access to inpatient care, all but the use of a general hospital shows an equal use distribution of the actual inpatient care. For general hospitals, substantial negative and significant value indicates the poor are more likely to be hospitalized there than the rich. Overall access to inpatient care is negative and significant(−0.0695), which is obviously influenced by the probability of hospital admission at a general hospital. On the other hand, for the number of inpatient stays, all the indices are negative, except for clinics, and insignificant. And consequently, the result of the second stage of the decision process has an influence on total number of inpatient stays, apart from general hospitals which are affected by the probability of inpatient stays.

However, these distributions of utilization do not tell us inequity in inpatient care, since it does not consider the differences of need for care. In terms of the probability of hospital admission, except a hospital, the majority of the level of care is negative and insignificant, indicating that need−standardized use is distributed equitably across income. The index for general hospitals is most pro−poor(−0.0595). It seems understandable that the poor are more likely to be hospitalized in general hospitals, because they often have more severe health conditions. On the other hand, a pro−rich tendency emerges in the use distribution of hospitalization at a hospital. Figure 4−1 shows the HIwv indices of the probability of hospital admission.

In relation to the number of stays at a hospital, compared with

the probability of inpatient care, the HIwv indices are more pro-poor for hospitals and more pro-rich for clinics and general hospitals. All the indices are insignificant, indicating that there is no inequity in the number of inpatient stays. But a pro-poor tendency for hospitals is found; there are pro-rich tendencies for clinics and general hospitals, which means the rich tend to be admitted there longer, and in most cases, it is doctor-driven. The indices for the number of stays at a hospital are shown in Figure 4-2.

The HIwv indices of overall inpatient care use show no evidence of inequity in inpatient care, but there are pro-poor patterns for the probability of hospitalization(-0.0260), the conditional number of stays(-0.0458), and total number of stays(-0.0589). All in all, the probability of any stays affects total number of stays for general hospitals; the number of inpatient stays influences total number of inpatient days for overall inpatient care, clinics and hospitals. And this result, which the supply-side process is more influential on total number of care, is not surprising considering that inpatient care is inherently inclined to be doctor-driven. Notably, for clinics, there are pro-rich tendencies for total number of stays(0.0359) and the number of stays(0.0911). Although there are little clues here for the pro-rich tendency for clinics, it might be connected with differences of service types such as elective procedures compared with other levels of inpatient care. The indices for total inpatient stays are shown in Figure 4-3.

Figure 4-1. Inequity Indices(HIwv) for the Probability of Inpatient Care(with 95% confidence intervals)

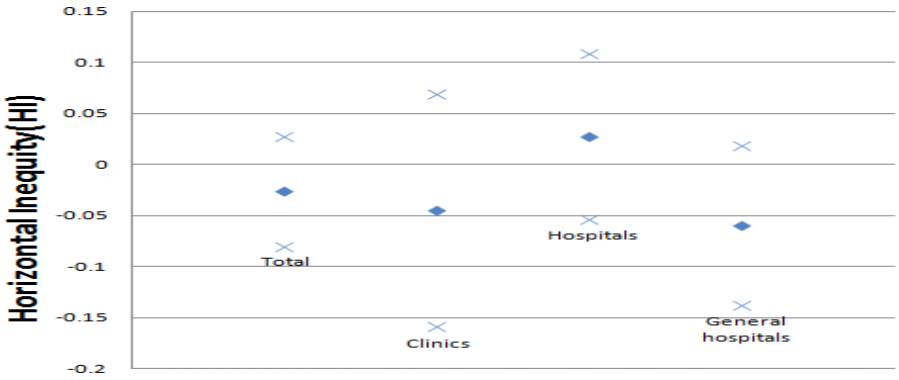


Figure 4-2. Inequity Indices(HIwv) for the Number of Inpatient days(with 95% confidence intervals)

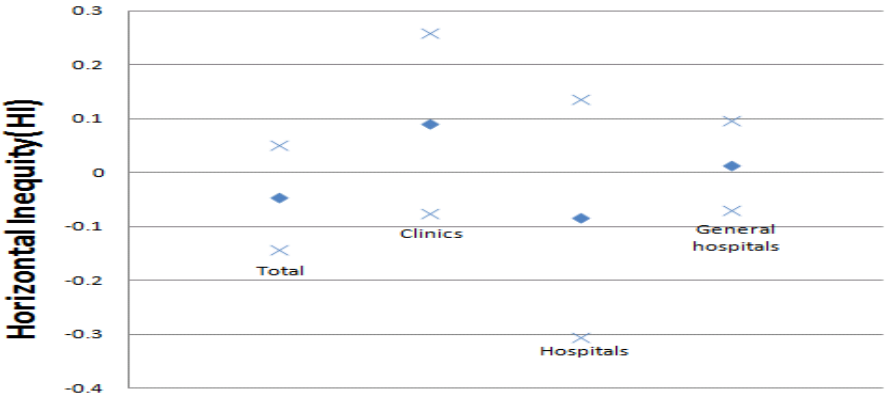
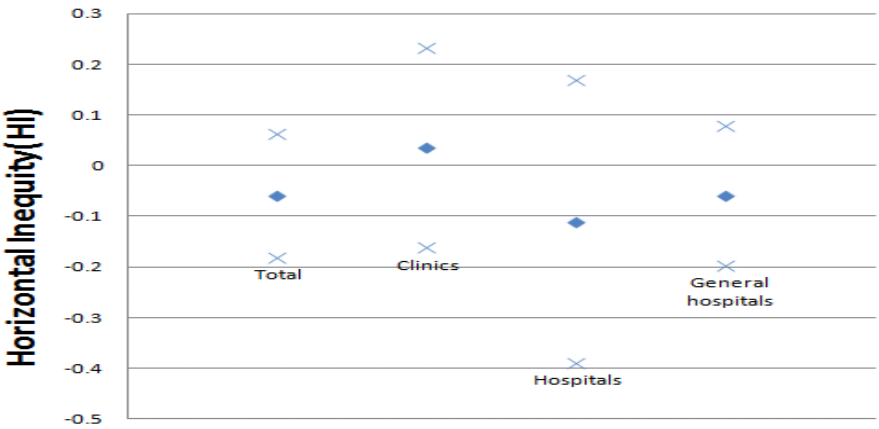


Figure 4-3. Inequity Indices(HIwv) for Total days of Inpatient Care(with 95% confidence intervals)



3. Medical expenditure per use(or day)

Up to now we have looked at health care utilization from the point of quantitative view, it would be helpful to investigate horizontal inequity in medical expenditure per use(or day) in order to comprehend diverse aspects of health care. We focus only on the two-part decision process which are the probability of any positive medical expenditure per use(or day) and the positive medical expenditure per use(or day). Of 6073 individuals, 6040 individuals for the outpatient care expenditure analysis and 6015 persons for the inpatient care expenditure analysis were included because of missing data on expenditure.

1) Outpatient care

In terms of the concentration indices of the actual outpatient care expenditure, except for overall expenditure and dental care, the concentration indices for the probability of any positive expenditure per use are negative. And their statistical significance differs by level and type of care. The values for health centers, clinics, and general hospitals are negative and significant, indicating that the poor are likely to pay more for them than the rich; the index for the probability of overall outpatient expenditure is positive and significant. For the conditional positive expenditure, generally, the rich paid more for care than the poor, which results in the positive and significant concentration index for overall positive expenditure.

Again, these unequal distributions of expenditure cannot be seen as inequitable owing to the need differences among income groups. After need-standardization, all the HIwv indices for the probability of any positive expenditure are insignificant, indicating that the probability of any costs is

equitably distributed across income. The HI indices for health centers, clinics, hospitals, and general hospitals are negative, most pronounced at health centers(−0.1585). On the other hand, the HIwv index for the likelihood of overall costs is a small pro−rich pattern(0.0025); the indices for dental care and LTMPs show remarkable pro−rich tendencies(0.0817 for dental care and 0.0324 for LTMPs).

As with the second stage of the decision process, the distributions are quite striking. We find most HIwv indices more pro−rich than in the first stage of the decision process. And half of the indices turn out to be significant pro−rich inequity in the costs for hospitals, dental care, LTMPs, and overall, most pronounced for hospitals(0.0297), while the probability of any positive cost for such care is equitable. This means the poor are more likely to pay in the demand−side process, but the rich tend to pay more in the supply−side process, which might be related to higher willingness to pay of the rich and possibilities of physician−induced demand. Interestingly, the index for health centers turns out to be positive and insignificant, which indicates that the better−off tend to pay more for the care. Supposedly, it might be associated with greater willingness to pay of the rich and services for preventive care or medical check−ups.

The HIwv index for overall positive expenditure per use presents a significant modest pro−rich bias(0.0088). Notably, the HIwv indices for dental care and LTMPs are pro−rich tendencies through both the two−part decision processes, indicating that the rich are more likely to pay and tend to pay more for such care. It may be connected with preferred access to care due to high out−of−pocket payments and greater willingness to pay of the better−off combined with some

doctor-driven services. The HIwv indices for the probability of any costs per use with 95% confidence intervals are shown graphically in Figure 5-1. And ones of the conditional expenditure per use are presented in Figure 5-2. In addition, the extents of indices in both stages are relatively small.

Figure 5-1. Inequity Indices(HIwv) for the Probability of any Outpatient Expenditure per use(with 95% confidence intervals)

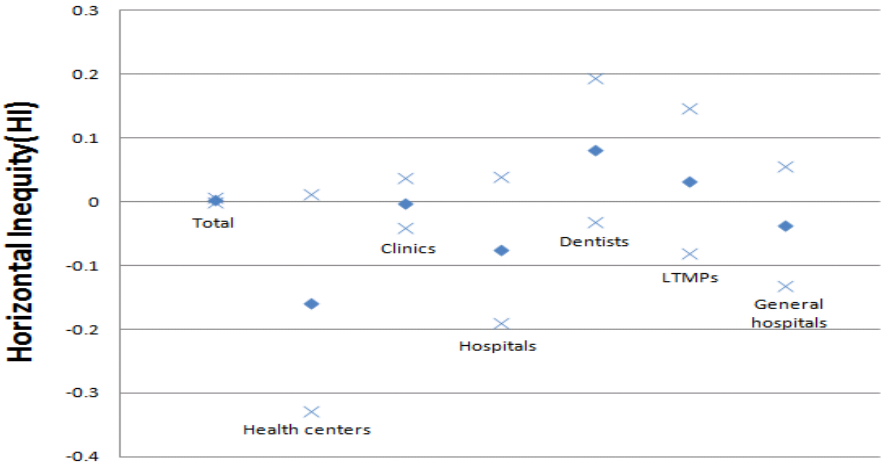
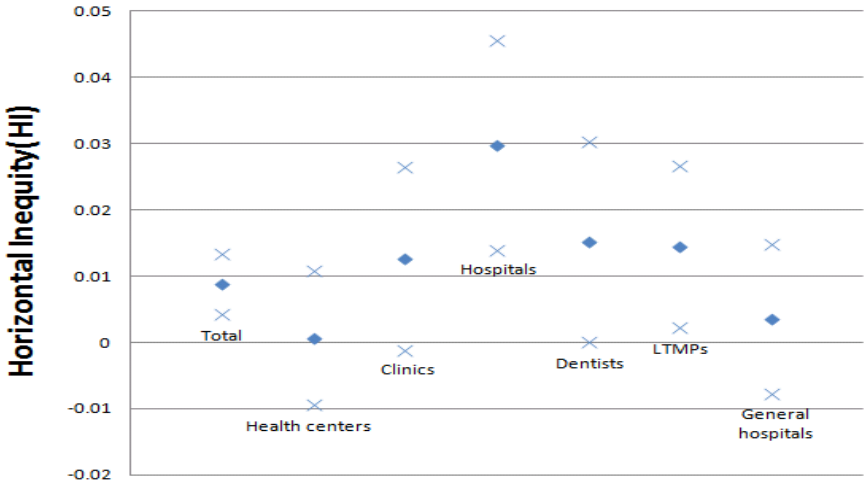


Figure 5-2. Inequity Indices(HIwv) for (ln)Outpatient Expenditure per use(with 95% confidence intervals)



2) Inpatient care

All the concentration indices for the probability of any actual inpatient care expenditure per day are negative and only significant for general hospitals(−0.0812), indicating that the poor are likely to pay more for such care. On the other hand, for the second stage of the decision process, all the concentration indices are positive and insignificant, which means there is no inequality in the positive expenditure by level of care. But the HIwv index for overall positive cost per day is positive and significant, indicating that the rich tend to pay more for overall inpatient care.

However, we can talk about inequity in inpatient care expenditure only after need standardization. The HIwv indices for the probability of any inpatient costs differ by level of care. All the indices are negative, except for hospitals, and insignificant, indicating that there is no inequity in the probability of any positive cost for inpatient care.

In terms of the second stage of the decision process, things are strikingly different from the previous one. Except for the cost for hospitals, the HIwv indices for the positive inpatient costs are more pro−rich than those of the probability of any costs. The HIwv index for overall positive inpatient costs indicates significant small pro−rich inequity(0.0076). The HIwv indices for inpatient care expenditure per day with 95% confidence intervals are provided in Figure 6−1 and Figure 6−2.

Figure 6-1. Inequity Indices(HIwv) for the Probability of Inpatient Expenditure per day(with 95% confidence intervals)

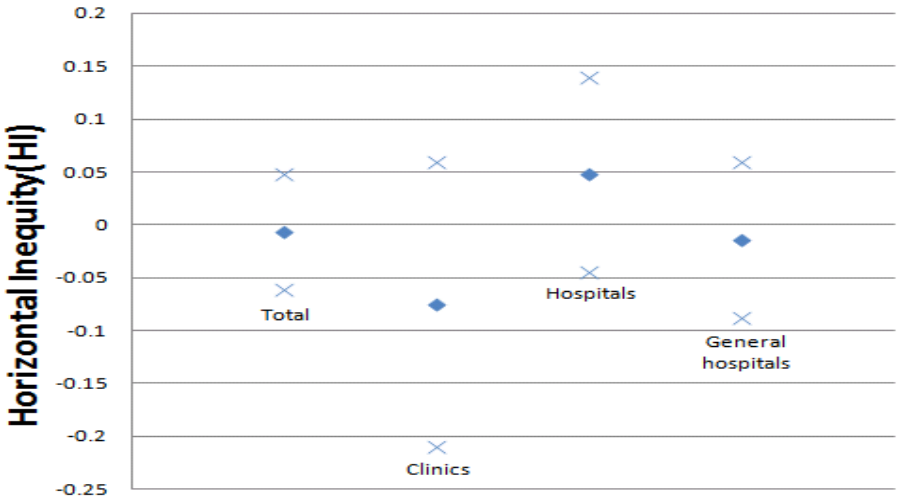
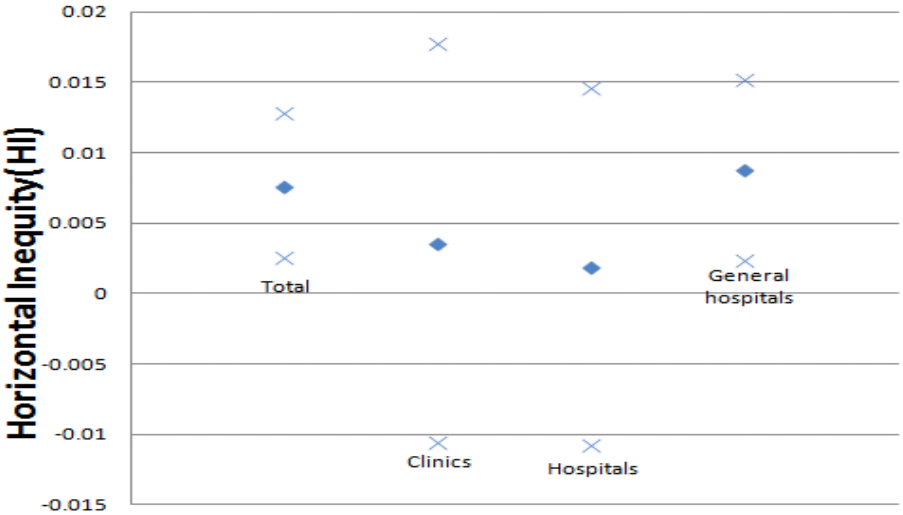


Figure 6-2. Inequity Indices(HIwv) for (ln)Inpatient Expenditure per day(with 95% confidence intervals)



C. Explaining Inequality in Health care

Having provided a landscape of horizontal inequity in health care by level and type of care, it is worth turning to causes of inequalities in health care using the decomposition approach. For outpatient care, inpatient care, and medical expenditure, we summarize all decomposition analyses in Table 4-7(see appendices) and show some of those graphically in Figure 7-Figure 10.

1. Outpatient care

Figure 7-1 shows the extent and direction of the contributions of inequality in outpatient care utilization. The contributions are decomposed into the contributions of income, other non-need variables, need variables, and an error term. For need contributions, age-gender interaction terms, self-assessed health variables, chronic disease variables, activity limitation variables were summed.

The sum of the bars would be zero, if the probability of any outpatient care visits were equally distributed across income groups. With a perfect equity, the need bar would be the only one to be seen(van Doorslaer, Koolman et al. 2004). If there are disparities between the actual and need-standardized utilization, the other bars will emerge owing to either the contributions of income and other non-need variables or the effect of an error term, which is not explained by the regression(van Doorslaer, Koolman et al. 2004).

We find inequality in the probability of any outpatient care use is pro-poor mainly because of the contributions of need variables. Also, the effect of income is a considerable negative

contribution to inequality in the use of health centers and hospitals; a large positive contribution of income appears in the utilization of dental care and LTMPs. A low education contributes to inequality in visits to health centers. Rural residents are more inclined to visit a health center resulting in a negative contribution to inequality. Medicaid status has some roles in positive inequality in visits to LTMPs, showing that the poor are less likely to visit a LTMP. Those holding private insurance contributes to positive inequality in the use of health centers and hospitals. Along with a positive inequality contribution of occupational status in having a visit to health centers, it might be related to some services for preventive care like medical check-ups for work or utilization by working mothers for ante-natal care, indicating that these variables act as the indirect effects of income.

Meanwhile, the decomposition of inequality for the subsequent visits is presented in Figure 7-2. Compared with Figure 7-1, the effect of need is more pronounced, except general hospitals which the contribution of need has substantially been decreased. Furthermore, non-need variables including income have a greater impact on inequality in the use of outpatient care. Except LTMPs and general hospitals, the contribution of income generates negative inequality, indicating that the poor tend to use outpatient care more frequently. With regard to education, there is a negative contribution in the use of health centers and a positive contribution in the use of clinics and hospitals. It means that those who are less educated tend to visit health centers more often; those who are better educated prefer to visit facilities providing more sophisticated services. For dental care, education contributing to large negative inequality shows that those who are less educated tend to have more dental care needs and to see a dentist more frequently. Occupational status

has a great role in the use of hospitals and dental care, producing positive inequality. City residents tend to utilize hospitals and LTMPs more often; rural residents tend to use general hospitals more often, which might be relevant to their severe health problems. In terms of medicaid status, those with medicaid status tend to visit a hospital less frequently and to use LTMPs more often. By comparison with the probability of any visits, the contribution of private insurance is more important in the use of health centers. Probably, it might be related to the same reasons for a positive inequality contribution in the probability of such care use as discussed above. And those not holding private insurance tend to visit LTMPs more often; for general hospitals, private insurance has an important role in positive inequality. On the whole, the contributions of inequality in total visits of outpatient care are similar to those of the probability of any visits as shown in Figure 7-3.

Figure 7-1. Decomposition of Inequality for the Probability of Visits of Outpatient Care

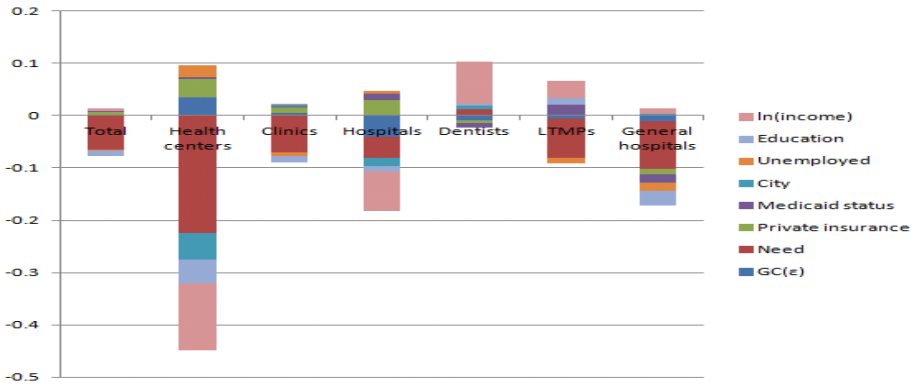


Figure 7-2. Decomposition of Inequality for the Number of Visits of Outpatient Care

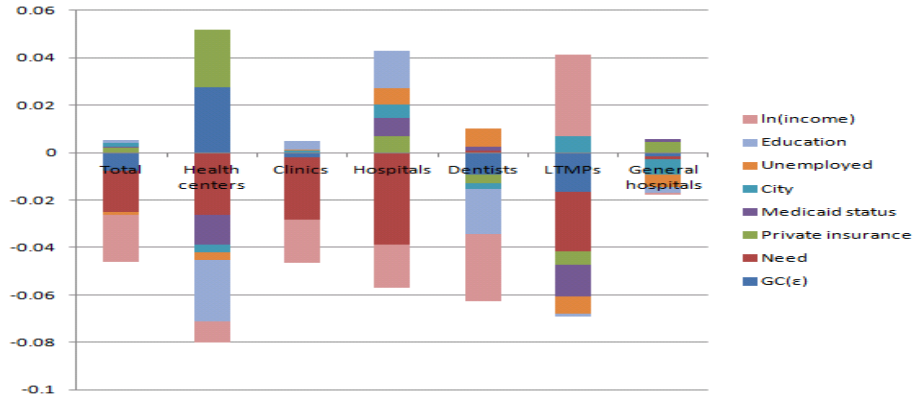
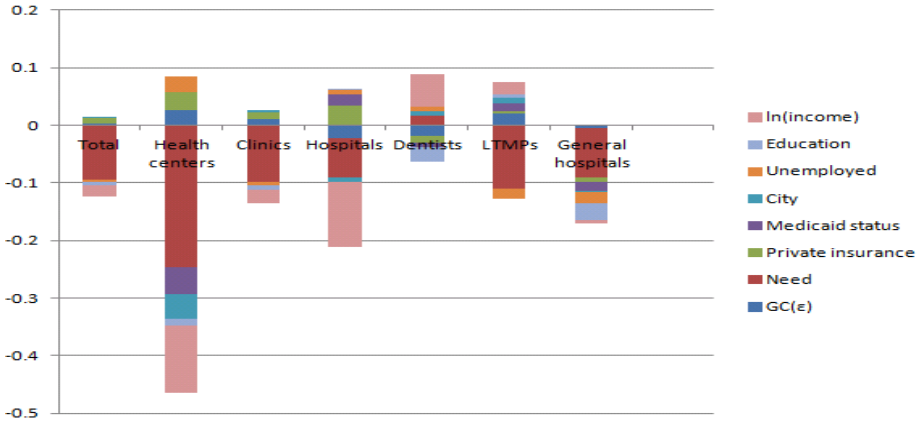


Figure 7-3. Decomposition of Inequality for Total visits of Outpatient Care



2. Inpatient care

Compared with the decomposition of inequality for outpatient care, need factors have relatively little impacts on inpatient care utilization, but the effects of non-need variables are substantial as seen in Figure 8-1, Figure 8-2, and Figure 8-3. Figure 8-1 reveals contributions of inequality in the probability of hospital admission. Income is a huge negative inequality contribution in the likelihood of clinics use and a positive inequality contribution in the probability of hospitals use. Education contributes to negative inequality in the probability of inpatient care use. The unemployed are more likely to be admitted at clinics and general hospitals. Except for general hospitals, holding private insurance has an important role in a positive inequality contribution in the likelihood of most levels of inpatient care.

Meanwhile, sources of greater inequality in the number of stays at a hospital are presented in Figure 8-2. Income contributes to remarkable positive inequality, especially in the use of clinics and general hospitals. The influence of education is important resulting in considerable negative inequality in the use of hospitals and general hospitals; at the same time education contributes to positive inequality in the use of clinics. The contributions of occupation status and private insurance are more important for negative inequality in the use of clinics. All in all, decomposition of inequality in total days of inpatient care shows a similar look of inequality in the probability of inpatient care presented in Figure 8-3.

Figure 8-1. Decomposition of Inequality for the Probability of Days of Inpatient Care

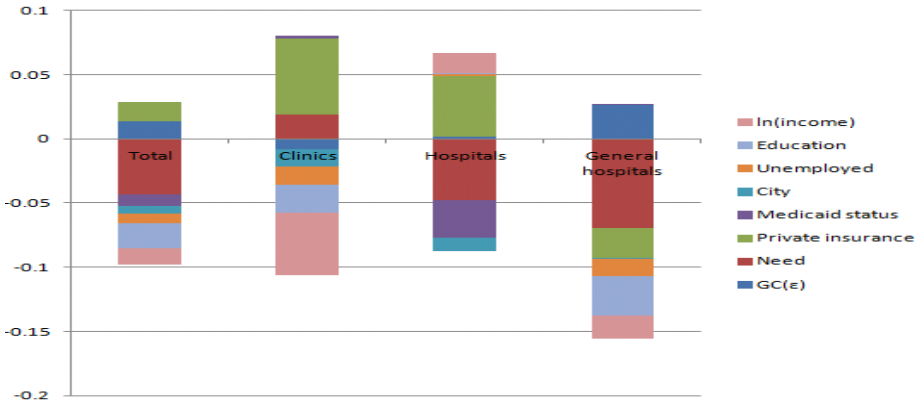


Figure 8-2. Decomposition of Inequality for the Number of Days of Inpatient Care

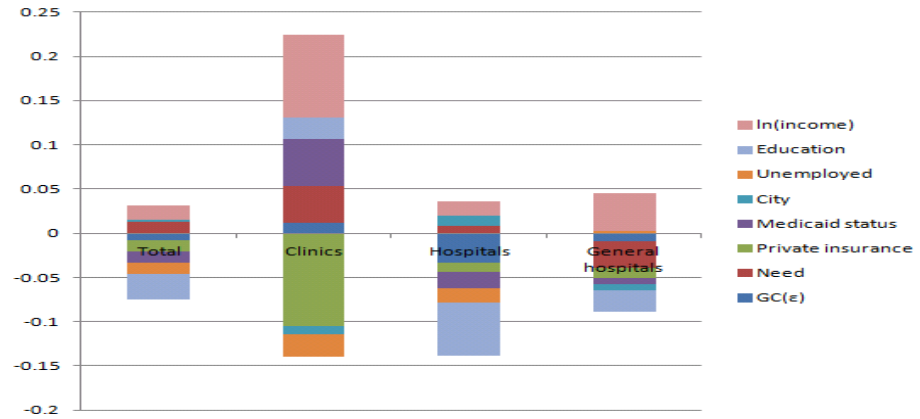
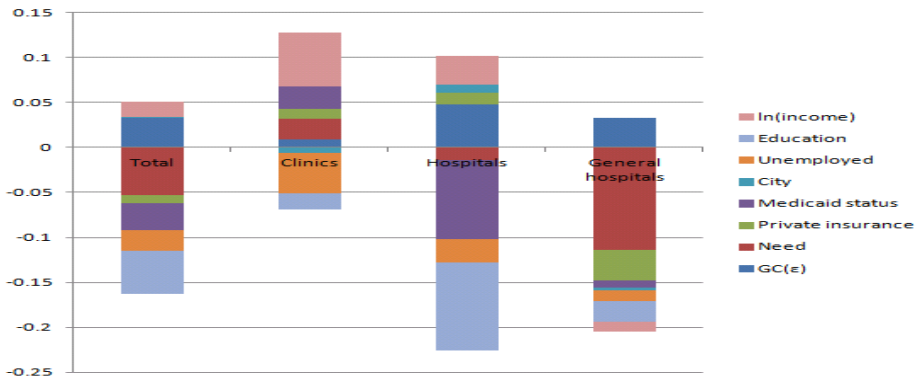


Figure 8-3. Decomposition of Inequality for Total Days of Inpatient Care



3. Medical expenditure per use(or day)

1) Outpatient care

Inequality in the probability of any positive outpatient expenditure per use is decomposed into detailed factors in Figure 9-1. Need factors contribute to considerable negative inequality, indicating that the poor are more likely to pay because of their greater health care needs. The contribution of income is considerable leading to a positive inequality contribution for dental care, LTMPs, and general hospitals; at the same time there is a negative inequality contribution of income for health centers, clinics, and hospitals. The employed are more likely to pay for some services at health centers; the unemployed who are concentrated among the poor produce negative inequality in the likelihood of cost for general hospitals. Rural residents are more likely to pay for health centers. Medicaid status generates positive inequality in the outlay for most type and level of care, indicating that those who hold the medicaid status have a less chance of paying. Private insurance contributes to positive inequality in the cost for health centers, clinics, and hospitals.

Meanwhile, Figure 9-2 reveals contributions of inequality in the positive outpatient care cost per use. In comparison with Figure 9-1, the effect of need is reduced, but non-need variables contribute more to pro-rich inequality. Even need variable produces positive inequality in the use of health centers, clinics, and LTMPs, which indicates that the healthy paid more for some services associated with preventive care like medical check-ups. We can find that a strong contribution of income contributes to positive inequality in the likelihood of paying among most level and type of care, apart from clinics,

LTMPs, and general hospitals. A pro-rich pattern in the cost for hospitals is due mainly to a positive inequality contribution of higher education. City residents tend to pay more for dental care and general hospitals. Holding private insurance has a great role in inequality in the outlay, especially for LTMPs and general hospitals, leading to positive inequality.

Figure 9-1. Decomposition of Inequality for the Probability of any Outpatient Expenditure per use

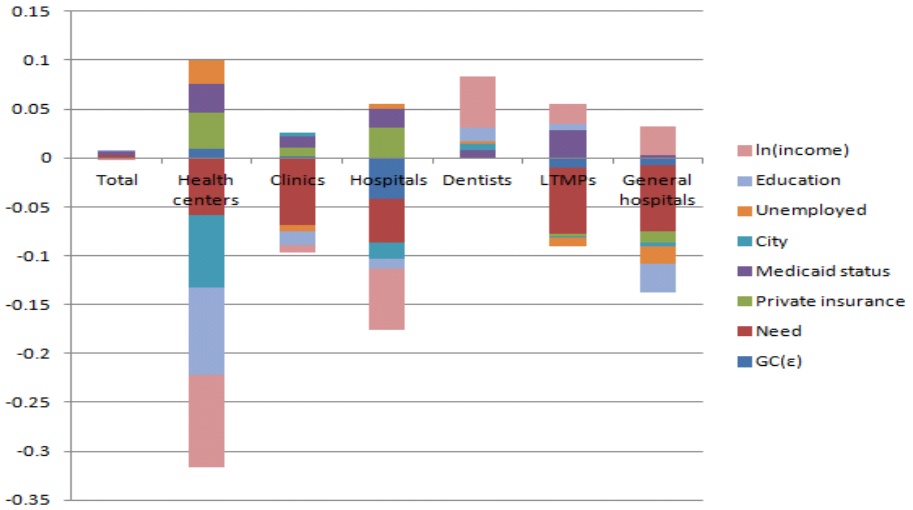
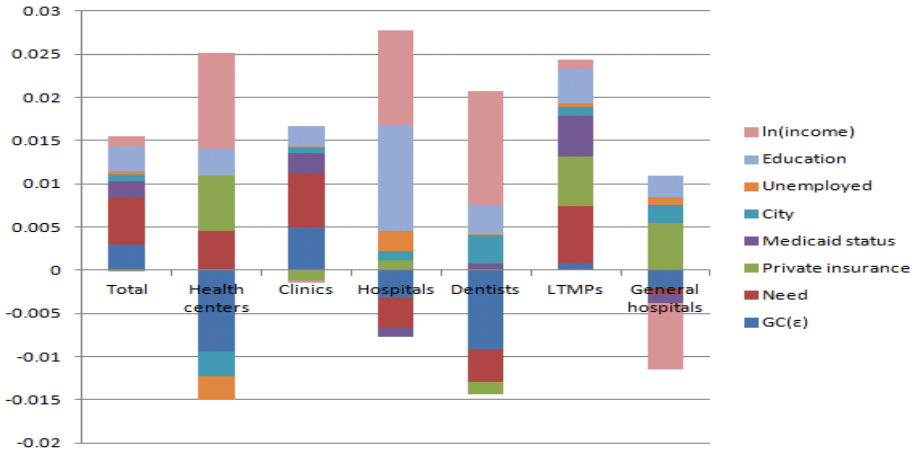


Figure 9-2. Decomposition of Inequality for (ln)Outpatient Expenditure per use



2) Inpatient care

Figure 10-1 presented the decomposition of inequality for the probability of any inpatient cost per day. Compared with outpatient care expenditure, the contribution of need factor is decreased. Furthermore, need contributes to positive inequality in the cost for clinics, which means that the healthy have a more chance of paying for services related to preventive care or elective procedures; at the same time it makes a negative inequality contribution in the expenditure for hospitals, general hospitals, and overall. Income generates a considerable negative inequality contribution in the outlay for clinics and a positive inequality contribution in the cost for overall, hospitals, and general hospitals. The contributions of education and the unemployed make negative inequality in the cost of inpatient care. A take-up of private insurance produces positive inequality contributions in the cost for clinics and hospitals but negative inequality contributions in the outlay for general hospitals.

Figure 10-2, on the other hand, illustrates causes of inequality in the positive inpatient expenditure per day. The contribution of need is somewhat diminished compared with Figure 10-1. Furthermore, non-need variables contribute remarkably to inequality. Income contributes substantially to inequality, in most cases, positive inequality, except for hospitals. The unemployed and education generate substantial negative inequality in the cost for clinics. City residents paid more for clinic and hospitals. The contribution of private insurance is sizable in the outlay for hospitals which made a negative contribution and for general hospitals which causes a positive inequality contribution.

Figure 10-1. Decomposition of Inequality for the Probability of any Inpatient Expenditure per day

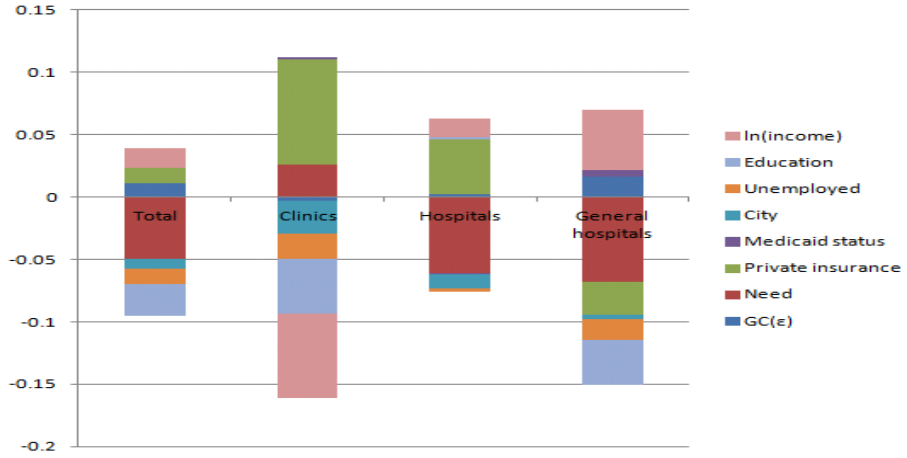
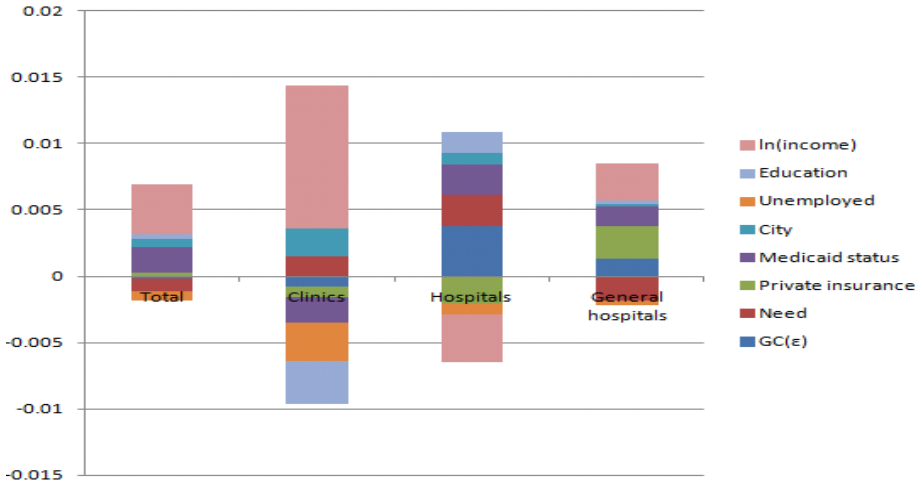


Figure 10-2. Decomposition of Inequality for (ln)Inpatient Expenditure per day



Ⅴ. Discussion and Conclusion

The purpose of this paper was to measure and explain the extent of income-related horizontal inequity in the delivery of health care in South Korea after the late 2000s, exploiting the concentration indices and the HIwv indices based on a one-and two-part model.

A. Measuring Inequality and Inequity in Health care

1. Outpatient care utilization

In terms of outpatient care utilization, the findings have shown the actual use of outpatient care is substantially favoring the worse-off, and in most cases, significant. But all the need-standardized use of outpatient care is statistically insignificant. Even though this indicates there is no inequity in outpatient care use, we need to examine the direction and extent of inequity. For the one-part model, except dental care and LTMPs, the HIwv indices show pro-poor inequity trends. The positive inequity patterns in the need-standardized use of dental care and LTMPs may be relevant to low access to such care due mainly to non-trivial out-of-pocket payments and the preference of the rich.

The separation of the decision process, i.e. an initial contact and subsequent visits, offers a more detailed and different picture for outpatient care. On the whole, the probability of any visits has a greater impact on total number of visits mainly leading to pro-poor inequity than the number of visits, which

means that the disproportionate distribution of access to care primarily causes horizontal inequity in the overall outpatient care use. Therefore, we can tell that inequity in the observed outpatient care utilization is more driven by patient rather than doctor(van Doorslaer, Koolman et al. 2004). The main exceptions are overall visits and clinics, where the degrees of inequity in total observed visits of care come from inequity in the second stage of the decision.

Interestingly, for the likelihood of outpatient care use, there are pro-rich tendencies for primary care such as clinics, dental care, and LTMPs, except health centers, which are the results of all the non-need factors like income, private insurance, a better education, city residents, and the employed. On the other hand, pro-poor patterns appear for secondary care, such as hospitals and general hospitals, because of the contributions of need, the less educated, lower income groups, and the unemployed.

For the frequency of visits to a doctor, evidence of a socio-economic gradient in health care is found. That is, the rich who are likely to be better-educated tend to use complicated services in a hospital more frequently; the poor who are likely to be less educated tend to have a visit to a health center more often.

This trend has carried on over time in the period between 1998 and 2010 by comparison with the Korean literature(Lu, Leung et al. 2007; Rhim and Lee 2010), which would be explained by several factors. Supposedly, it may be associated with health policies of reducing out-of-pocket payments for certain populations after the late 2000s. Through the health policies, access to secondary care for the poor seems to be improved.

Furthermore, the preference and health seeking behavior of the rich have some roles in this trend. On the grounds that the better-off are inclined to be better educated and city residents, they are more likely to be aggressive for seeking medical care. The advantaged might readily recognize health care needs and easily obtain relevant information on good services(Allin, Masseria et al. 2006). Furthermore, they tend to be more demanding clients with higher willingness to pay for some services like preventive care or sophisticated services(van Doorslaer, Koolman et al. 2004; Allin, Masseria et al. 2006).

Even though there is a time difference to compare with the results of OECD countries and European countries which used data of 1996(van Doorslaer, Koolman et al. 2004; van Doorslaer and Masseria 2004), inequity in primary care is less pro-poor; inequity in secondary care is more pro-poor in South Korea throughout both the two-part decision processes. It would be explained by the ambiguous distinction between primary care and secondary care(van Doorslaer, Koolman et al. 2004).

For dental care, positive and insignificant inequity is found. But compared with OECD countries, a more pro-poor tendency in the first stage appears, and even significant pro-poor inequity emerges in the second stage of the decision process. However, the extent of pro-rich inequity in dental care has been increasing over time as seen in OECD countries(van Doorslaer and Masseria 2004; Allin, Masseria et al. 2006; Rhim and Lee 2010).

Remarkably, there is a significant discrepancy in an inequity trend of outpatient care between South Korea and other countries. In OECD countries and European countries, more pro-poor patterns appear in the second stage of the decision

process than in the probability of outpatient care(both a GP care and specialists care)(van Doorslaer, Koolman et al. 2004; van Doorslaer and Masseria 2004). In South Korea, as with secondary care, less pro-poor tendencies emerge in the second stage of the decision process than in the first stage. This would suggest that although the poor are more likely to have a visit to secondary care owing to their higher health care needs, once access to care is made, the worse-off seem to see a doctor less frequently. As seen in the decomposition analysis below, non-need variables, especially income, private insurance, and education, have a substantial impact on the subsequent visits. This finding would imply that there are some barriers for the disadvantaged to continue to use secondary care, although they are likely to have severe health conditions in general. Meanwhile, more pro-poor patterns in the second stage of the decision process are found in the use of primary care like clinics, dental care, and LTMPs, to which the contributions of need, low income groups, medicaid status, and the unemployed may contribute. Probably, it might be related to the differential co-payments according to level of care.

2. Inpatient care utilization

In relation to inpatient care, most indices are insignificant, which means that use of inpatient care is equally and equitably distributed across income groups. For the extent and direction of inequity, in general, the distributions of the actual use of inpatient care are in favor of the poor, except clinics. After need standardization, overall, access to inpatient care is pro-poor because of the contributions of low income, the unemployed, and the less educated.

For the second stage of the decision process, relatively great

pro-rich patterns appear in the use of clinics and general hospitals. It means that the rich tend to use such inpatient care far longer owing to the results of the contributions of high income and a better education. This would suggest that for the second stage of the decision process that is doctor-driven, it is not need, but non-need factors that determine the length of stay in a hospital, such as income, although health care needs are greater among the poor. This may be associated with higher willingness to pay of the better-off and some services produced by physician-induced demand. On the other hand, except general hospitals, total stays at a hospital is influenced by the number of days at a hospital which is doctor-driven.

For the one-part model, overall inequity in inpatient care shows a less pro-poor tendency compared with data from the 2005 Korean National Health and Nutrition Examination Survey(Rhim and Lee 2010). But more pro-poor patterns appear in the use of general hospitals, and more pro-rich tendencies are found in the use of hospitals and clinics. Supposedly, it is likely that health policies after the late 2000s, which lowered out-of-pocket payments, and the preference of the rich could have an influence on this trend.

By comparison with the findings of OECD countries(van Doorslaer and Masseria 2004), more pro-poor inequity appears for access to inpatient care, and more pro-rich emerges for the number of inpatient stays, except hospitals. It would imply that access to inpatient care in South Korea is in favor of the poor, but once the patients are hospitalized, they are not treated equally according to need. Rather, substantial non-need factors like income affect their length of stay at a hospital.

3. Medical expenditure per use (or day)

With regard to medical expenditure per use(or day), the actual distributions of medical costs are pro-poor in the likelihood of costs and pro-rich in the positive expenditure. Once need is controlled for, in relation to outpatient care expenditure, all the indices show pro-poor tendencies but are insignificant in the probability of any costs, which are related to the contributions of need, low income, the less educated, and rural residents, except for dental care and LTMPs. On the other hand, strikingly, all the indices are positive in the positive expenditure per use; some are significant in the outlay for overall, hospitals, dental care, and LTMPs, which mainly accounted for the effects of the healthy, income, the better educated, and private insurance. Interestingly, there is a more pro-rich trend than in the first stage. This indicates that the poor are more likely to pay than the rich because of their higher health care needs, but the rich tend to pay more owing to their greater willingness to pay for preventive care and sophisticated services.

With respect to inpatient care expenditure, similar patterns appear. The likelihood of any expenditure is a pro-poor tendency, although insignificant. But modest pro-rich inequity emerges in the positive costs per day, which the main contributions are income, private insurance, and the better educated.

This pro-rich pattern in the positive expenditure has decreased than before. Kwon et al.(2003) use data from the 1998 Korean National Health and Nutrition Examination Survey and find the HIwv index of the imputed medical expenditure, which aggregated outpatient care outlay and inpatient care cost, is 0.064, although they do not consider non-need factors.

Compared with that, our study provides apparent evidence of decreasing pro-rich inequity in the positive medical expenditure, but still, there is significant pro-rich inequity. Furthermore, by comparison with European countries and the U.S(van Doorslaer, Wagstaff et al. 2000), more inequity favoring the rich appears in South Korea.

B. Explaining Inequality in Health care

This paper investigates sources of inequality in health care by the decomposition method, which offers helpful insight into explaining inequality in health care. With respect to outpatient care utilization, although the most significant factors are need variables generating pro-poor inequality, the contributions of non-need variables are more pronounced in the second stage of the decision process. In the second stage, income is the most important variable among non-need variables and in most cases, contributes to pro-poor inequality, indicating that the poor tend to use outpatient care more, except LTMPs. The better educated tend to use higher level of care like hospitals, producing a pro-rich inequality contribution; at the same time the less educated tend to use health centers contributing to pro-poor inequality. In general, the employed and those holding private insurance contribute to pro-rich inequality, which means that these variables serve as the indirect effect of income. For region of residence, a pro-poor inequality contribution for health centers in the first stage of the decision process indicates that it may be associated with availability of services. But in the second stage, a contribution of region generates pro-rich inequality for hospitals and LTMPs, which suggests that region is a proxy for competition among doctors. People with medicaid status tend to use health centers and LTMPs more and to have a visit to hospitals less frequently.

The contribution of need has been similar over time in the period between 1998 and 2010. But non-need contributions have been substantially increasing, especially the effect of income, resulting in more pro-rich inequality in primary care such as health centers, clinics, LTMPs, and dental care(Lu, Leung et al. 2007; Rhim and Lee 2010).

In terms of inpatient care utilization, surprisingly, the contribution of need variable is less important than for outpatient care use. It might be associated with inappropriate need proxies for inpatient care, as Wagstaff and van Doorslaer(2000) mentioned. On the other hand, non-need factors contribute substantially to pro-rich inequality. The contribution of income is most pronounced, particularly in the second stage of the decision process, producing pro-rich inequality. Less educated people who are likely to be low-income groups tend to stay longer in a hospital and general hospitals; the better educated tend to stay longer in clinics. In contrast to outpatient care, occupation status contributes to pro-poor inequality, indicating that the unemployed are more likely to be hospitalized and tend to stay at a hospital longer. They may be retired or quit their job owing to their health conditions; also, workers might have a higher opportunity cost for inpatient care than the unemployed, thereby being stymied in the use of inpatient care(Leu and Schellhorn 2006). Based on the detailed decomposition analysis in the appendix, for general hospitals, non-participation in labor force affects the probability of inpatient care, i.e. access to care, more than the conditional number of stays. Therefore, the account of the opportunity cost of the employed would sound more convincing. On the other hand, economic activity status has more impacts on the number of inpatient stays in clinics and hospitals than on the likelihood of inpatient care. Thus, this variable here acts as

a proxy for such inpatient care need(Leu and Schellhorn 2006). A take-up of private insurance considerably contributed to pro-rich inequality in the likelihood of inpatient care but not the length of stay at a hospital. Compared with previous studies in the period between 1998 and 2010, the contribution of need has been rather decreased since 2005; at the same time the effects of non-need variables have been continuously rising(Lu, Leung et al. 2007; Rhim and Lee 2010).

As with medical expenditure, for outpatient care expenditure, need variables are important in the probability of any costs but not in the positive expenditure. And non-need variables contribute to pro-rich inequality, particularly income, private insurance, and education. For inpatient care expenditure, by comparison with outpatient care cost, need variables are somewhat less important. But non-need variables, such as income, education, and private insurance, contribute substantially to pro-rich inequality.

C. Implications

The results provide some evidence of the equitable distribution of overall health care utilization with pro-poor tendencies and of modest pro-rich inequity in the positive medical expenditures, which is consistent with the Korean literature(Kwon, Yang et al. 2003; Shin and Kim 2006; Lu, Leung et al. 2007; Kim, Choi et al. 2008; Lee 2009; Rhim and Lee 2010; Kim, Shin et al. 2011; Kim 2011a; Kim 2011b; Choi 2012; Kim 2012a; Kim 2012b). For the decomposition analysis, although need factors are important, non-need variables, such as income, education, private insurance, and occupation status, are more important and considerably contribute to pro-rich inequality in health care. This finding is in accord with the

international literature(van Doorslaer, Koolman et al. 2002; van Doorslaer and Jones 2004; van Doorslaer, Koolman et al. 2004; van Doorslaer and Masseria 2004; Van Ourti 2004; Allin, Masseria et al. 2006; Leu and Schellhorn 2006; Lu, Leung et al. 2007; Crespo-Cebada and Urbanos-Garrido 2012).

Although the statistically insignificant HIwv indices indicate that the chance of the violation of the "equal treatment for equal need" principle is very slim, the distribution of health care utilization after need standardization should be more pro-poor considering the greater needs of the worse-off. Compared with the international evidence, for outpatient care, the disadvantaged in South Korea are less likely to have access to primary care, except health centers; there is a pro-poor pattern in the use of secondary care, indicating that access to such care for the poor is improved. Supposedly, it may be associated with health policies of lowering out-of-pocket payments for certain populations after the late 2000s or the preference of the rich.

Once the individuals come in contact with the health system, they tend to be treated equally according to need. But for secondary care, a more pro-rich pattern seems to appear in comparison with access to care. This means though the poor are more likely to use secondary care because of their greater health care needs, given the initial contact, the poor tend to visit a hospital less frequently. This would suggest that the disadvantaged have barrier to continuing to use secondary care, although they are inclined to have severe health conditions.

In addition, there is evidence of a socio-economic gradient in health care. That is, the better-off who are likely to be better-educated tend to use sophisticated services in a hospital more

often; the worse-off who are likely to be less educated tend to have a visit to a health center more frequently(van Doorslaer, Koolman et al. 2004; Allin, Masseria et al. 2006).

For inpatient care, access to care is pro-poor, except hospitals, while pro-rich tendencies appear in the number of inpatient stays in clinics and general hospitals. As mentioned earlier, we find that more pro-rich in primary care and more pro-poor in secondary care emerge in the probability of outpatient care use. Along with pro-poor tendency in the likelihood of inpatient care, it would suggest that lower take-up of primary care leads to higher chances to use secondary care, which results in a higher likelihood of hospitalization for the worse-off(Allin, Masseria et al. 2006).

For the one-part model, inequity in overall inpatient care shows a less pro-poor tendency compared with data from the 2005 KNHANES(Rhim and Lee 2010). But more pro-poor patterns appear in the use of general hospitals, and more pro-rich tendencies are found in the use of clinics and hospitals. Supposedly, it is likely that health policies after the late 2000s, which lowered out-of-pocket payments, and the preference of the rich could affect this trend. By comparison with the findings of OECD countries(van Doorslaer and Masseria 2004), more pro-poor inequity patterns appear for access to inpatient care, and more pro-rich trends emerge for the number of inpatient stays, except hospitals. It would imply that access to inpatient care in South Korea is in favor of the poor, but once the patients are hospitalized, they are not treated equally according to need. Rather, substantial non-need factors, like income, affect their length of stay at a hospital.

Furthermore, the worse-off are more likely to have

expenditure on health care because of their higher need. But modest pro-rich inequity in the positive medical expenditure owing to the contributions of income and education indicates the better-off may be able to enjoy more expensive and good quality of services in the health system.

It is possible that the socio-economic differences in the utilization have an influence on differential health outcome across income groups(Kawachi and Kennedy 1999; van Doorslaer and Masseria 2004; Kondo, Sembajwe et al. 2009). Thus, there should be more appropriate health policies for tackling low access to care and non-trivial out-of-pocket payments for the poor, so that they could get appropriate care in a timely manner according to their higher needs.

D. Limitations

While the paper adds to the body of evidence of horizontal equity in health care use, there are several limitations. First of all, since the paper relies on self-reported data, information on health care utilization and expenditure may have low reliability because of recall bias(Allin, Masseria et al. 2006). Secondly, the analysis only accounts for horizontal inequity in quantities of health care use but not in quality of use such as intensity of care and appropriateness of care. Thirdly, need variables used in the analysis may have been not a good proxy for health care need, especially for inpatient care and dental care. Need factors used are age, gender, self-assessed health, the number of chronic diseases, and activity limitation because of any health problems; these are commonly used in the analyses of horizontal inequity in health care. Unfortunately, because of the lack of data, there does not seem to be better proxies for need. Finally, we decomposed the two-part decision process into the

initial contact, assuming that it is patient-driven, and the subsequent visits, postulating that these are doctor-driven, which may not be true in practice. Without further information, the initial visit in the reference period, especially a short duration of outpatient care, need not necessarily be patient-driven, nor need it be doctor-driven, since it may be in a continuous illness episode of the previous spell(Pohlmeier and Ulrich 1995). But for outpatient care, the majority of the sample, accounting for about 70% of the individuals, has at most one visit during the past two weeks, and therefore, we can assume that a multiple of illness episodes are outliers(Pohlmeier and Ulrich 1995). Furthermore, household data are more appropriate for exploring the determinants of the probability of medical use, because data on the supply-side process are scarce leading to unobserved heterogeneity in the second stage of the decision process(Pohlmeier and Ulrich 1995).

E. Conclusions

This paper provides the evidence on horizontal inequity in health care utilization in South Korea in several strands. First, we investigate and explain horizontal inequity in health care by level and type of care, exploiting the concentration indices and the HIwv indices based on a one-and two-part model. This approach yields useful insight into diverse and comprehensive dimensions of health care. Secondly, we measure horizontal inequity in medical care use after the late 2000s, when many health policies for the reduction of high out-of-pocket payments appeared around. Lastly, we try to overcome the methodological limitations of the Korean literature by considering the decomposition method, non-need variables, and a complex survey design. And consequently, we could provide

the more accurate and reliable analysis on the extent of income-related inequality and inequity in health care.

The hypotheses were to be tested in the paper as follows:

(1) The probability of health care utilization will be pro-poor or equitable, and the number of health care use and medical expenditure will be pro-rich.

☞ Overall, the mixed results were shown by level and type of care with the equitable distribution of health care use and pro-rich inequity in the positive medical expenditure.

(2) With regard to horizontal inequity in health care by level of care, there will be a socio-economic gradient in health care utilization: while use of health centers will be pro-poor, a pro-rich distribution will be found as the level of care is higher.

☞ This could not be rejected only as for outpatient care use. In the first stage of the decision process, primary care is pro-rich, except health centers, and pro-poor tendencies appear in secondary care. However, this trend turns out to be weaker in the second stage of the decision process. In the second stage of the decision process, the use of health centers is favoring the poor, and the rich tend to use a hospital more often.

(3) In terms of horizontal inequity in health care by type of care, the most pro-rich inequity will be found in visits to a dentist.

☞ This was rejected. Even though there is a pro-rich tendency in the probability of and total number of dental care visits, the distributions of dental care use are equitable, even with

significant pro-poor inequity in the number of visits. Rather, inequity in the use of LTMPs is sizable pro-rich through both the two-part decision processes, although insignificant.

The findings shed light on what have been achieved and what to do for improving the equity in Korean health system. We find the degree of horizontal inequity in health care in South Korea is fairly equitable, and policies for reducing out-of-pocket payments since the late 2000s have worked in some ways by improving access to secondary care for the disadvantaged. But the poor still have some barriers to access to primary care and to continuing to receive medical care. Therefore, there needs to be relevant policies to tackle these problems.

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APPENDIX

Table A1−1. Decomposition of Inequality for Probability of Visits of Outpatient Care

	Total	Health centers	Clinics	Hospitals	Dentists	LTMPs †	General hospitals
CM	**−0.0638**	**−0.3517**	**−0.0677**	**−0.1349**	0.0788	−0.026	**−0.1588**
HI	0.0006	−0.1268	0.002	−0.0952	0.067	0.0489	−0.0664
Contribution to CI							
GC(ε)	0.0008	0.0351	0.0046	−0.041	−0.0092	−0.0059	−0.0098
ln(income)	0.0055	−0.1273	0.0009	−0.0738	0.0793	0.0324	0.0112
Need							
M35−44	0.0011	−0.0017	0.0005	0.003	0.0042	−0.0046	0.0029
M45−64	0.0019	−0.0014	−0.0002	0.0094	0.0028	−0.0005	0.0077
M65−74	−0.0051	−0.0402	−0.0034	0.0003	−0.0033	−0.002	−0.0053
M75+	−0.0063	−0.0385	−0.0039	0.0009	−0.0004	0.0035	−0.0233
F19−34	0.0039	0.0068	0.0035	0.0109	0.0065	−0.0006	−0.0017
F35−44	0.0021	0.0002	0.0024	0.0018	0.0005	0.0013	0.0016
F45−64	0.0018	0.0027	0.0019	0.0031	0.0012	0.0012	−0.0003
F65−74	−0.0102	−0.087	−0.0151	−0.0109	0.0028	−0.0102	0.0212
F75+	−0.007	−0.0376	−0.01	−0.0159	0.0063	−0.0085	0.0223
SAH good	−0.0025	−0.0032	−0.0027	0.001	−0.0095	0.0109	−0.0041
SAH fair	−0.001	−0.0026	−0.0008	0.0011	−0.003	0.0017	−0.0018
SAH poor	−0.0014	−0.0028	0.001	−0.0038	0.0052	−0.0227	−0.0107
SAH very poor	−0.0022	−0.002	−0.0002	−0.002	0.0008	−0.0115	−0.0164
Chronic disease1	−0.0046	−0.005	−0.0054	−0.0026	0.0004	−0.0043	−0.0042
Chronic disease2	−0.0127	−0.0067	−0.0165	−0.0009	0.0059	−0.0114	−0.0244
Chronic disease3	−0.005	0.0014	−0.0042	−0.0034	0.0011	−0.0024	−0.0168
Chronic disease4+	−0.0053	0.0102	−0.0054	−0.0021	−0.0087	−0.0015	−0.0104
limitation	−0.012	−0.0172	−0.0112	−0.0295	−0.0012	−0.0135	−0.0287
Need Subtotal	−0.0645	−0.2246	−0.0697	−0.0396	0.0116	−0.0751	−0.0924
Non−need							
Middle school	0.0006	0.0063	−0.0003	0.0024	0.0024	0	−0.001
High school	−0.0013	−0.0046	−0.0015	−0.0009	−0.0016	0.001	−0.0018
Over College	−0.0094	−0.0476	−0.0103	−0.0132	0.0026	0.0114	−0.0255
Unemployed	−0.0031	0.0237	−0.0072	0.0041	0.001	−0.0103	−0.016
City	0.0002	−0.0509	0.0038	−0.0156	0.0072	−0.0005	0.0026
Medicaid status	0.0006	0.0035	0.0008	0.0122	−0.009	0.0194	−0.0161
Private insurance	0.0068	0.0347	0.0112	0.0305	−0.0055	0.0016	−0.01
Non−need Subtotal	−0.0056	−0.0349	−0.0035	0.0195	−0.0029	0.0226	−0.0678

Significant indices in bold ($p<0.05$) for coefficients, CM, and HI. †: LTMPs stands for Licensed Traditional Medical Practitioners.

Table A1−2. Decomposition of Inequality for Number of Visits of Outpatient Care

	Total	Health centers	Clinics	Hospitals	Dentists	LTMPs †	General hospitals
C_M	−0.0409	−0.0282	**−0.0417**	−0.0139	−0.0525	−0.028	−0.0124
HI	−0.0094	−0.0222	−0.0052	0.0543	**−0.0587**	0.0342	−0.0044
Contribution to CI							
GC(ε)	−0.0075	0.0274	−0.002	0.0001	−0.0092	−0.0167	−0.0017
ln(income)	−0.0198	−0.0088	−0.0182	−0.0181	−0.0281	0.0343	−0.0008
Need							
M35−44	−0.0003	0.0088	−0.0002	−0.0039	0.0022	−0.0025	0.0014
M45−64	−0.0002	−0.0064	−0.0005	−0.0054	0.0013	0.0038	0.001
M65−74	−0.001	0.0007	−0.0001	−0.006	−0.0061	−0.0093	−0.0009
M75+	0.00002	−0.0042	0.0002	−0.0061	−0.0032	−0.0003	0.0012
F19−34	−0.0011	−0.0026	−0.0011	−0.0041	0.0012	0.0005	−0.0014
F35−44	0.0003	−0.0026	0.0007	−0.0056	0.0027	−0.0003	0.0017
F45−64	0.0002	−0.00003	0.0004	−0.0023	0.0005	0.0009	−0.00008
F65−74	−0.0036	0.0001	−0.0038	0.0083	−0.0033	−0.0022	−0.0036
F75+	−0.0031	−0.0021	−0.0026	−0.0034	0.0015	−0.0016	−0.0011
SAH good	0.0016	−0.0027	0.0017	0.0014	−0.0039	−0.0085	0.0025
SAH fair	0	−0.0018	−0.0006	−0.0017	−0.0011	−0.0019	0.001
SAH poor	−0.0036	0.0055	−0.0033	−0.002	−0.0004	0.0019	0.001
SAH very poor	−0.0005	0.0029	−0.00004	−0.0003	0.0025	−0.0004	0.0007
Chronic disease1	−0.0005	−0.0012	−0.0003	−0.0059	−0.0032	−0.0019	0.0019
Chronic disease2	−0.0009	−0.00007	−0.0009	−0.0073	0.0034	0.0023	−0.0007
Chronic disease3	0.0011	−0.0005	0.0005	−0.0016	−0.00003	0.0019	0.0005
Chronic disease4+	0.0001	−0.0259	−0.0081	0.0008	0.001	0.0005	−0.00001
limitation	−0.006	0.0059	−0.0081	0.0062	0.0056	−0.0078	−0.0063
Need Subtotal	−0.0175	−0.0262	−0.0261	−0.0389	0.0007	−0.0249	−0.0012
Non−need							
Middle school	−0.0006	−0.0009	−0.0004	0.0007	0.0006	0.0002	−0.0013
High school	0.0002	0.0005	0.0002	0.0019	−0.0003	−0.0012	0.0007
Over College	0.0015	−0.0256	0.0037	0.0132	−0.0195	−0.0004	−0.0019
Unemployed	−0.0013	−0.0032	0.0006	0.007	0.0075	−0.0071	−0.0054
City	0.0018	−0.003	0.0008	0.0056	−0.0023	0.007	−0.0064
Medicaid status	0.0002	−0.0129	0.00005	0.0076	0.0018	−0.0134	0.0009
Private insurance	0.0021	0.0244	−0.0003	0.007	−0.0037	−0.0058	0.0046
Non−need Subtotal	0.0039	−0.0207	0.0046	0.043	−0.0159	−0.0207	−0.0088

Significant indices in bold ($p<0.05$) for coefficients, C_M, and HI.
†: LTMPs stands for Licensed Traditional Medical Practitioners.

Table A1−3. Decomposition of Inequality for Total Visits of Outpatient Care

	Total	Health centers	Clinics	Hospitals	Dentists	LTMPs †	General hospitals
CM	**−0.1047**	**−0.3799**	**−0.1094**	**−0.1488**	0.0263	−0.054	**−0.171**
HI	−0.0135	−0.1333	−0.0101	−0.0818	0.0094	0.0555	−0.0855
Contribution to CI							
GC(ε)	0.0031	0.02693	0.0113	−0.0227	−0.019	0.0198	−0.0048
ln(income)	−0.0196	−0.1165	−0.0238	−0.1144	0.0565	0.0211	−0.0066
Need							
M35−44	0.0009	−0.0007	0.0006	0.0021	0.0061	−0.004	0.0028
M45−64	0.0013	−0.0027	−0.001	0.0084	0.0021	0.0016	0.0082
M65−74	−0.006	−0.0346	−0.0033	−0.0014	−0.0066	−0.011	−0.0046
M75+	−0.0066	−0.0797	−0.0036	−0.0047	−0.0024	0.0029	−0.017
F19−34	0.0025	0.0056	0.0022	0.0069	0.0057	−4E−04	−0.0021
F35−44	0.0023	0.00004	0.0029	−0.0007	0.0024	0.0006	0.0029
F45−64	0.002	0.0029	0.0023	0.0019	0.0011	0.0019	−0.0002
F65−74	−0.0153	−0.0727	−0.0218	−0.003	0.0037	−0.012	0.0178
F75+	−0.0123	−0.036	−0.0158	−0.0264	0.0093	−0.012	0.0228
SAH good	−0.0013	−0.0007	−0.0016	0.0068	−0.0119	0.004	−0.0002
SAH fair	−0.0011	−0.0029	−0.0015	0.001	−0.0035	0.0007	−0.0002
SAH poor	−0.0055	0.0034	−0.0027	−0.0076	0.0034	−0.027	−0.0086
SAH very poor	−0.0032	0.0121	−0.0004	−0.0076	0.0043	−0.019	−0.0149
Chronic disease1	−0.0048	−0.0064	−0.0053	−0.0066	−0.0026	−0.004	−0.0022
Chronic disease2	−0.014	−0.0086	−0.0178	−0.0078	0.0088	−0.009	−0.027
Chronic disease3	−0.0054	−0.0017	−0.0029	−0.0052	0.0024	0.0014	−0.0154
Chronic disease4+	−0.0052	−0.0239	−0.0052	0.0013	−0.0065	−0.001	−0.0097
limitation	−0.0219	−0.00007	−0.0243	−0.0245	0.0011	−0.023	−0.0379
Need Subtotal	−0.0936	−0.2466	−0.0992	−0.0671	0.0169	−0.11	−0.0855
Non−need							
Middle school	−0.00007	0.0004	−0.0009	0.0026	0.0033	0.0001	−0.0024
High school	−0.0009	−0.0014	−0.001	0.0009	−0.0023	−5E−04	−0.0014
Over College	−0.0064	−0.0103	−0.0048	−0.0019	−0.0257	0.0052	−0.0256
Unemployed	−0.004	0.0262	−0.006	0.0078	0.009	−0.019	−0.0186
City	0.0018	−0.0424	0.0038	−0.008	0.0071	0.0099	−0.0033
Medicaid status	0.0006	−0.0471	0.001	0.0203	−0.0082	0.0148	−0.0141
Private insurance	0.009	0.0309	0.0102	0.0337	−0.0113	0.0041	−0.0089
Non−need Subtotal	0.00003	−0.0437	0.0023	0.0554	−0.0281	0.0148	−0.0743

Significant indices in bold ($p<0.05$) for coefficients, CM, and HI.
†: LTMPs stands for Licensed Traditional Medical Practitioners.

Table A2−1. Decomposition of Inequality for Probability of Days of Inpatient Care

	Total	Clinics	Hospitals	General hospitals
C_M	**−0.0695**	−0.0254	−0.0208	**−0.1288**
HI	−0.026	−0.0445	0.0274	−0.0595
Contribution to CI				
GC(ε)	0.014	−0.0077	0.002	0.0264
ln(income)	−0.013	−0.0486	0.0158	−0.0177
Need				
M35−44	−0.0007	0.0085	−0.003	−0.0026
M45−64	−0.0027	−0.0015	−0.0033	−0.0014
M65−74	−0.00002	0.0038	0.0038	−0.0024
M75+	0.0013	−0.0034	0.0088	−0.0002
F19−34	0.0078	0.0136	0.0116	0.0025
F35−44	−0.0006	0.0064	0	−0.0029
F45−64	−0.0011	0	−0.0008	−0.0016
F65−74	0.008	0.0127	−0.0092	0.0213
F75+	0.0026	0.0159	0.0015	−0.0024
SAH good	−0.0032	−0.0198	0.0028	−0.0013
SAH fair	−0.0019	−0.0121	0.0026	−0.001
SAH poor	0.001	0.0271	−0.0133	0.0009
SAH very poor	−0.0093	0.0126	−0.0186	−0.0163
Chronic disease1	−0.0033	−0.01	−0.0035	−0.0014
Chronic disease2	−0.0055	−0.0022	0.0059	−0.0144
Chronic disease3	−0.0043	0.0016	−0.0016	−0.0071
Chronic disease4+	−0.0037	0	0.0057	−0.0088
limitation	−0.0278	−0.0342	−0.0375	−0.0301
Need Subtotal	−0.0434	0.019	−0.0481	−0.0692
Non−need				
Middle school	0.00003	0.0013	0.0002	−0.0005
High school	−0.0007	0	−0.0004	−0.0009
Over College	−0.0186	−0.023	0.0007	−0.0298
Unemployed	−0.0075	−0.0143	0.0016	−0.0131
City	−0.0065	−0.0138	−0.0108	−0.0009
Medicaid status	−0.0086	0.0026	−0.0286	0.0004
Private insurance	0.0148	0.0591	0.0468	−0.0235
Non−need Subtotal	−0.0271	0.0119	0.0095	−0.0683

Significant indices in bold ($p<0.05$) for coefficients, C_M, and HI.

Table A2-2. Decomposition of Inequality for Number of Days of Inpatient Care

	Total	Clinics	Hospitals	General hospitals
C_M	−0.0429	0.0843	−0.1032	−0.0433
HI	−0.0458	0.0911	−0.0839	0.013
Contribution to CI				
GC(ε)	−0.0076	0.0119	−0.0338	−0.0092
ln(income)	0.0166	0.0939	0.0161	0.0434
Need				
M35−44	−0.0039	−0.0095	0.0087	−0.0087
M45−64	0.0064	0.039	0.0083	−0.0083
M65−74	0.0091	0.0119	−0.0006	0.0086
M75+	0.0103	0.0132	0.0056	0.0059
F19−34	−0.0084	−0.0151	−0.002	−0.01
F35−44	−0.004	−0.0067	−0.0006	−0.0088
F45−64	−0.0034	−0.0048	−0.0023	−0.0051
F65−74	0.0221	0.048	0.0315	0.0078
F75+	0.0189	−0.0249	0.0275	0.0148
SAH good	0.0049	0.0066	0.0049	0.0159
SAH fair	0.0037	0.0081	−0.002	0.0095
SAH poor	−0.0049	0.0021	0.0007	−0.0232
SAH very poor	−0.0044	−0.0235	−0.0125	−0.003
Chronic disease1	−0.0054	−0.0012	−0.0043	−0.0016
Chronic disease2	−0.003	0.0263	−0.0344	0.0025
Chronic disease3	−0.0026	0.0008	−0.0067	−0.0039
Chronic disease4+	0.0017	0.0139	−0.0009	−0.0025
limitation	−0.0241	−0.0428	−0.0127	−0.0201
Need Subtotal	0.013	0.0414	0.0082	−0.0302
Non−need				
Middle school	0.0007	−0.0031	0.0017	−0.0002
High school	−0.0013	0.0046	−0.0058	0.0006
Over College	−0.0279	0.0228	−0.057	−0.0246
Unemployed	−0.0132	−0.0261	−0.0162	0.0019
City	0.0023	−0.0092	0.0116	−0.0068
Medicaid status	−0.0119	0.0527	−0.0181	−0.0073
Private insurance	−0.0136	−0.1046	−0.0099	−0.0109
Non−need Subtotal	−0.0649	−0.0629	−0.0937	−0.0473

Significant indices in bold ($p<0.05$) for coefficients, C_M, and HI.

Table A2-3. Decomposition of Inequality for Total Days of Inpatient Care

	Total	Clinics	Hospitals	General hospitals
C_M	−0.1123	0.0589	−0.124	**−0.1722**
HI	−0.0589	0.0359	−0.1103	−0.0584
Contribution to CI				
GC(ε)	0.0334	0.0087	0.0477	0.0328
ln(income)	0.0171	0.06	0.0316	−0.0109
Need				
M35−44	−0.0022	0.001	0.0037	−0.008
M45−64	0.0063	0.0246	0.0056	−0.0004
M65−74	0.0096	0.0169	0.0144	0.0031
M75+	0.0135	0.0144	0.029	0.0015
F19−34	−0.0033	−0.0057	0.0014	−0.0058
F35−44	−0.003	0	0.0006	−0.00689
F45−64	−0.0038	−0.0036	−0.0032	−0.0044
F65−74	0.0318	0.0375	0.0428	0.0214
F75+	0.0285	0.0275	0.0551	0.0088
SAH good	0.0033	−0.0001	−0.0003	0.0074
SAH fair	0.0017	0.0022	−0.0022	0.0043
SAH poor	−0.0052	0.0122	−0.0042	−0.0129
SAH very poor	−0.0229	0.016	−0.068	−0.0046
Chronic disease1	−0.0088	−0.0255	−0.0091	−0.0019
Chronic disease2	−0.0121	0.0066	−0.0189	−0.0146
Chronic disease3	−0.0081	0.0076	−0.0093	−0.0135
Chronic disease4+	−0.0012	0.0027	0.0151	−0.015
limitation	−0.0775	−0.1114	−0.0663	−0.0723
Need Subtotal	−0.0534	0.023	−0.0138	−0.1138
Non−need				
Middle school	0.0019	0.0046	0.0041	−0.0008
High school	−0.0023	0.0021	−0.0089	0.0008
Over College	−0.0477	−0.0248	−0.0927	−0.0231
Unemployed	−0.0231	−0.0449	−0.0265	−0.0119
City	0.0005	−0.0062	0.009	−0.0033
Medicaid status	−0.0297	0.025	−0.0881	−0.0079
Private insurance	−0.009	0.0114	0.0136	−0.0341
Non−need Subtotal	−0.1094	−0.0328	−0.1895	−0.0803

Significant indices in bold ($p<0.05$) for coefficients, C_M, and HI.

Table A3−1. Decomposition of Inequality for Probability of Outpatient Cost per use

	Total	Health centers	Clinics	Hospitals	Dentists	LTMPs †	General hospitals
CM	**0.0053**	**−0.2169**	**−0.0705**	−0.1204	0.0821	−0.035	**−0.1057**
HI	0.0025	−0.1585	−0.0018	−0.0753	0.0817	0.0324	−0.0375
Contribution to CI							
GC(ε)	−0.0009	0.0097	0.001	−0.0417	0.0004	−0.0102	−0.0072
ln(income)	−0.0013	−0.0947	−0.007	−0.0629	0.0517	0.0212	0.0289
Need							
M35−44	−0.00005	−0.003	0.0008	0.0034	0.0037	−0.0059	0.0047
M45−64	−0.0003	0.0038	−0.00008	0.008	0.0004	−0.0015	0.0083
M65−74	0.0005	−0.0313	−0.0038	0.00001	−0.0058	−0.0013	−0.0078
M75+	0.0007	−0.0202	−0.0034	0.0006	−0.0044	0.0042	−0.0176
F19−34	−0.00007	0.0025	0.0037	0.0111	0.0092	−0.001	−0.0008
F35−44	0.00004	0.0008	0.0028	0.0018	0.0018	0.0015	0.0034
F45−64	0.00002	0.0068	0.0022	0.0031	0.0018	0.0007	0.0015
F65−74	0.0003	−0.0126	−0.0154	−0.01	0.0026	−0.0053	0.0122
F75+	0.0003	0.0066	−0.0098	−0.0127	0.0037	−0.0075	0.0136
SAH good	0.0003	−0.022	−0.0028	0.0001	−0.01	0.0111	−0.0011
SAH fair	0.0001	−0.0065	−0.0008	0.0006	−0.0024	0.0013	−0.0004
SAH poor	0	0.0177	0.0006	−0.0014	0.0046	−0.0225	−0.0116
SAH very poor	0.0003	0.0266	−0.0003	−0.0025	0.0004	−0.0123	−0.0057
Chronic disease1	0.0002	−0.0107	−0.0054	−0.0039	−0.0021	−0.0033	−0.0038
Chronic disease2	0.0002	−0.0054	−0.0172	−0.0034	0.0049	−0.0101	−0.0226
Chronic disease3	0.00003	0.0046	−0.0038	−0.0053	−0.0022	−0.0031	−0.0147
Chronic disease4+	0.0001	0.0027	−0.0042	−0.0037	−0.0102	−0.001	−0.0111
limitation	0.0003	−0.0186	−0.0118	−0.031	0.0042	−0.0114	−0.0148
Need Subtotal	0.003	−0.0582	−0.0687	−0.0452	0.0002	−0.0674	−0.0683
Non−need							
Middle school	−0.0002	0.0101	−0.0004	0.002	0.0026	0.0002	−0.0007
High school	0.0002	−0.0068	−0.0015	−0.0004	−0.0005	0.0002	−0.0014
Over College	0.0014	−0.0917	−0.0128	−0.0116	0.0125	0.0061	−0.0274
Unemployed	0.00003	0.0234	−0.006	0.0059	0.0026	−0.0091	−0.0179
City	0.0003	−0.075	0.0033	−0.0161	0.0056	−0.0016	−0.0036
Medicaid status	0.0033	0.0299	0.0116	0.0189	0.0078	0.028	0.0032
Private insurance	−0.0005	0.0364	0.01	0.0307	−0.0008	−0.0024	−0.0113
Non−need Subtotal	0.0045	−0.0737	0.0042	0.0294	0.0298	0.0214	−0.0591

Significant indices in bold ($p<0.05$) for coefficients, CM, and HI.
†: LTMPs stands for Licensed Traditional Medical Practitioners.

Table A3−2. Decomposition of Inequality for (ln)Outpatient Cost per use

	Total	Health centers	Clinics	Hospitals	Dentists	LTMPs †	General hospitals
CM	**0.0156**	0.0101	**0.0154**	**0.0194**	0.0063	**0.0245**	−0.0006
HI	**0.0088**	0.0007	0.0126	**0.0297**	**0.0152**	**0.0144**	0.0036
Contribution to CI							
GC(ε)	0.003	−0.0094	0.0049	−0.0031	−0.0092	0.0007	−0.0021
ln(income)	0.0012	0.0111	−0.0002	0.011	0.0132	0.0011	−0.0077
Need							
M35−44	0.00009	0.0017	−0.00005	0.0007	−0.0007	0.0006	0.0002
M45−64	0.00027	0.0016	0	0.001	−0.0005	−0.0002	0.0005
M65−74	0.0008	−0.0006	0.0013	−0.0013	−0.0021	0.0018	−0.0002
M75+	0.0004	−0.0013	0.0009	−0.0003	−0.001	0.0015	−0.0005
F19−34	0.0003	0.0005	0.0002	0.001	0.0001	−0.00003	−0.0003
F35−44	0.0002	0.0006	0	0.0005	−0.0002	0.0002	0.0007
F45−64	0.0001	0.00001	0	0.0007	0.0003	0.00006	0.0004
F65−74	0.0016	−0.0032	0.0017	−0.0013	−0.0024	0.0024	−0.0008
F75+	0.0012	−0.0019	0.0013	0.00008	0	0.0018	−0.0012
SAH good	0.0002	0.0004	0.0006	−0.0007	0.0004	−0.0015	−0.0016
SAH fair	0.00004	0.0003	0.0002	−0.0002	0.0001	−0.0009	−0.0002
SAH poor	−0.0005	0.0014	−0.001	0.0004	−0.0014	0.0021	0.0022
SAH very poor	−0.0004	0.0014	−0.0005	−0.0013	−0.0009	0.0008	0.0004
Chronic disease1	0.0005	0.0004	0.0004	−0.0005	0.0009	0.0003	0.0004
Chronic disease2	0.0003	0.0006	0.0005	−0.0019	0.0001	−0.0006	−0.0005
Chronic disease3	0.00007	0.0012	0.0001	−0.0016	0.0021	−0.0002	0.00006
Chronic disease4+	0.00007	0.0009	0.0001	−0.00005	0.0007	−0.0001	−0.0002
limitation	0.0003	0.0005	0.0006	0.0005	0.0008	−0.0013	0.0001
Need Subtotal	0.0055	0.0045	0.0063	−0.0036	−0.0037	0.0067	−0.0005
Non−need							
Middle school	−0.00007	−0.0002	−0.0001	−0.0003	−0.0002	0.00003	−0.0001
High school	0.0001	−0.0005	0.0001	0.0008	0.00004	0.0001	−0.0001
Over College	0.0029	0.0038	0.0024	0.0117	0.0035	0.0039	0.0026
Unemployed	0.0003	−0.0027	0.0001	0.0024	0.0002	0.0004	0.001
City	0.0008	−0.0029	0.0006	0.001	0.0032	0.001	0.002
Medicaid status	0.0018	0	0.0024	−0.001	0.0008	0.0048	−0.0012
Private insurance	−0.00002	0.0064	−0.0012	0.0012	−0.0015	0.0057	0.0055
Non−need Subtotal	0.0058	0.0039	0.0043	0.0158	0.006	0.0159	0.0097

Significant indices in bold ($p<0.05$) for coefficients, CM, and HI.
†: LTMPs stands for Licensed Traditional Medical Practitioners.

Table A4-1. Decomposition of Inequality for Probability of Inpatient Cost per day

	Total	Clinics	Hospitals	General hospitals
C_M	−0.0558	−0.0493	−0.0129	**−0.0812**
HI	−0.0065	−0.0749	0.0479	−0.0142
Contribution to CI				
GC(ε)	0.0106	−0.0018	0.006	0.0117
ln(income)	0.0157	−0.0723	0.0292	0.0098
Need				
M35−44	−0.0005	0.0095	−0.002	−0.0026
M45−64	−0.002	−0.004	−0.0014	0.0022
M65−74	−0.0032	−0.0054	0.0049	−0.0121
M75+	0.0021	−0.0059	0.0109	−0.0041
F19−34	0.012	0.026	0.0172	0.0059
F35−44	0.0003	0.0127	0.0014	−0.0012
F45−64	−0.0009	0.0021	0	−0.00007
F65−74	0.007	−0.0011	−0.0111	0.0079
F75+	0.0038	0.0124	0.0023	−0.0101
SAH good	−0.0047	−0.0338	0.0017	−0.0005
SAH fair	−0.0022	−0.0151	0.0019	−0.0013
SAH poor	0.0014	0.0428	−0.016	0.0003
SAH very poor	−0.0122	0.0106	−0.0116	−0.024
Chronic disease1	−0.0039	−0.0093	−0.0062	−0.0016
Chronic disease2	−0.0083	−0.0087	0.0053	−0.0154
Chronic disease3	−0.0056	0.0008	−0.0027	−0.0089
Chronic disease4+	−0.0049	0.0031	0.0024	−0.01
limitation	−0.0276	−0.0119	−0.0451	−0.0271
Need Subtotal	−0.0494	0.0248	−0.0481	−0.1027
Non−need				
Middle school	−0.0006	0.0006	−0.0003	−0.0007
High school	−0.0014	−0.0022	−0.0005	−0.0017
Over College	−0.0237	−0.0427	0.0025	−0.0343
Unemployed	−0.0122	−0.0202	−0.0023	−0.0164
City	−0.0078	−0.0261	−0.0114	−0.0031
Medicaid status	0.0006	0.0016	−0.0015	0.0047
Private insurance	0.0124	0.0848	0.0435	−0.0266
Non−need Subtotal	−0.0327	−0.0042	0.03	−0.0781

Significant indices in bold ($p<0.05$) for coefficients, C_M, and HI.

Table A4−2. Decomposition of Inequality for (ln)Inpatient Cost per day by Level

	Total	Clinics	Hospitals	General hospitals
C_M	**0.0051**	0.0048	0.0044	0.0063
HI	**0.0076**	0.0035	0.0019	**0.0088**
Contribution to CI				
GC(ε)	−0.0002	−0.0008	0.0038	0.0013
ln(income)	0.0037	0.0108	−0.0036	0.0028
Need				
M35−44	−0.00002	0.0003	0.00004	0.0001
M45−64	0.0006	0.0023	0.0009	0.0005
M65−74	−0.0008	−0.0006	0.0002	−0.001
M75+	−0.0003	0.0002	0.0013	−0.0007
F19−34	0.0004	0.0005	0.0004	0.0007
F35−44	0.0001	−0.00006	−0.0001	0.0003
F45−64	0.0002	−0.0001	0.0001	0.0003
F65−74	−0.0011	−0.0039	−0.0007	−0.0016
F75+	−0.0003	0	0.0015	−0.0005
SAH good	0.0003	−0.0003	0.0015	−0.00003
SAH fair	0.0001	−0.00001	0.0007	−0.0001
SAH poor	0.0005	−0.0005	−0.0016	0.0016
SAH very poor	−0.0001	0.0005	−0.0014	0
Chronic disease1	−0.0002	0.0008	−0.0003	−0.0005
Chronic disease2	−0.0003	0.0005	−0.0005	−0.0006
Chronic disease3	0.0002	0.0006	0.001	−0.0002
Chronic disease4+	−0.0003	0	−0.0002	−0.0004
limitation	0.0001	0.0013	−0.0005	0.0003
Need Subtotal	−0.0009	0.0015	0.0023	−0.0018
Non−need				
Middle school	0.00002	−0.0001	0.0003	0.00003
High school	0.0001	−0.0001	0.0001	0.0001
Over College	0.0003	−0.003	0.0012	0.0002
Unemployed	−0.0007	−0.0029	−0.0008	−0.0004
City	0.0006	0.0021	0.0009	0.0001
Medicaid status	0.0019	−0.0019	0.0023	0.0015
Private insurance	0.0003	−0.0008	−0.0021	0.0025
Non−need Subtotal	0.0025	−0.0067	0.0019	0.004

Significant indices in bold ($p<0.05$) for coefficients, C_M, and HI.

국문초록

의료기관 종별에 따른 의료이용의 수평적 형평성 분석

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연구배경

우리나라의 경우, 높은 본인부담금과 의료공급자간 경쟁의 상황 속에서, 보건의료에의 접근성, 재정적 위험으로부터의 보호, 그리고 비효율적인 보건의료전달체계에 대한 관심이 점차 늘어가고 있다. 2000년도 후반 이후로 이러한 문제들을 해결하고자 하는 보건정책들이 많아졌다. 따라서, 이러한 보건정책의 보건의료 수평적 형평성에 미친 영향에 관한 연구가 수행될 필요가 있다.

연구목적

본 연구의 목적은 한 단계 모형(one-part model)과 두 단계 모형(two-part model)을 적용하여 집중지수와 HIwv index를 구하여, 2000년도 후반 이후로, 의료기관 종별로 소득계층에 따른 수평적 형평성의 정도와 이에 영향을 미치는 요인을 파악하기 위함이다.

연구방법

본 연구는 2010년 국민건강영양조사를 사용하였다. 월평균 가구소득을 월평균 성인 1인당 개인소득으로 환산하였다. 의료이용변수는 외래이용, 입원이용, 의료비로 나누었고, 보건기관, 의원, 병원, 치과·병의원, 한방·병의원, 종합병원으로 의료기관 종별을 구분하였다. 의료필요변수는 연령, 성별, 주관적 건강상태, 만성질환 개수, 활동제한 여부를 사용하였고 그 외의 변수로 교육수준, 경제활동여부, 지역, 의료급여여부, 민간보험가입여부를 포함하였다. 의료이용에서 소득계층에 따른 수평적 형평성을 파악하기 위해 집중지수와 HIwv index를 사용하였다.

연구결과

의료이용은 HIwv index가 대부분 통계적으로 유의하지 않아 형평적으로 이루어지고 있지만, 저소득층에 유리한 불형평(pro-poor)경향이 나타났고, 의료비는 고소득층에 유리한 불형평(pro-rich)이 나타났다. 또한 의료필요요인이 중요하기는 했지만, 의료필요 이외의 요인들이 의료이용에 더 큰 영향을 미치는 것으로 나타났고 주로 고소득층에 유리한 불형평의 방향이었다. 외래이용의 경우, 1차 의료기관(의원, 치과병·의원 등)에 대한 접근성은 고소득층에 유리한 불형평이 나타났고 선행연구와 비교했을 때, 이러한 경향은 더 악화되고 있는 것으로 나타나 저소득층은 이러한 의료이용의 접근성에 다소 제약이 있는 것으로 생각된다. 반면에, 2차 의료기관(병원, 종합병원)에 대한 접근성은 저소득층에 유리한 불형평이 나타나 2000년도 후반 이후의 본인부담금 인하 정책 등으로 인해 저소득층의 2차 의료기관에 대한 접근성이 향상되었다고 판단된다. 일단 의료이용을 하게 되면, 의료필요에 따라 형평적으로 의료이용이 이루어지고 있었으나, 2차 의료기관 이용에 있어서 의료이용의 접근성과 비교했을 때, 고소득층에 유리한 불형평의 경향이 관찰되었다. 또한, 저소득층이 보건기관을 더 많이 이용하며, 병원이용은 고소득층이 더 많이 하는 소득계층에 따른 이용의 차이를 확인할 수 있었고, 이에 주로 교육수준이 큰 영향을 미쳤다. 또한 입원이용의 경우, 저소득층이 입원할 가능성은 더 높았으나, 일단 입원을 하면, 고소득층에 유리한 불형평이 의원과 종합병원에서 관찰되었다. 그리고, 의료비의 경우, 의료필요가 높은 저소득층이 의료비를 지불할 가능성이 높았다. 그러나, 일단 의료비를 내게 되면 소득과 교육의 효과로 통계적으로 유의하게 고소득층에 유리한 불형평이 나타났고, 이를 통해 고소득층이 보건의료체계 내에서 더 고가이고 높은 질을 가지는 의료서비스를 이용할 가능성이 있음을 예상할 수 있다.

결론

보건의료에서의 수평적 형평성은 HIwv index가 대부분 통계적으로 유의하지 않아 형평적인 것으로 나타났고, 2000년도 후반 이후, 저소득층, 암환자와 심혈관계 질환자 등의 본인부담금 인하정책으로 인해 저소득층의 2차 의료기관에 대한 접근성이 향상된 것으로 나타났다. 그러나 저소득층은 1차 의료기관 이용 접근성과 계속적인 의료이용에 다소 어려움이 있는 것으로 생각되며 이에 대한 정책적 접근이 필요하다.

주제어 : Two-part model, 수평적 형평성, 소득에 따른 불평등, 의료이용, 의료비, 대한민국

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