SOCIOECONOMIC EQUITY IN HEALTH CARE UTILISATION

IN SOUTH KOREA

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Abstract

Study Purpose

This study aims to investigate socioeconomic status (SES) related inequity in health care utilisation in Korea, comparing differences between income, wealth and education dimensions of socioeconomic status and inequity changes between 2005 and 2008, before and after implementation of the health insurance benefit expansion policy in 2006.

Research Method

Korean Welfare Panel Study (KOWEPS) data on 14,463 individuals in 2005 and 11,909 in 2008 are used to measure income, wealth and education-related inequity for multiple indicators of health care utilisation with varying depth of coverage in the Korean National Health Insurance program, after regression-based indirect standardization for health care need variables (including age, gender, self-assessed health and chronic conditions). Concentration indices are used for statistical tests and extreme group gaps are used to interpret the magnitude of inequity.

Results

After allowing for need, considerable pro-advantaged inequality is found for services with relatively shallow coverage, in particular, as medical checkups, total health care expenditure and tertiary hospital use. Conversely, with relatively deep coverage (outpatient visit, inpatient admissions and inpatient days) are utilized equally or favouring the less advantaged across the three socioeconomic dimensions. There was no change in pro-rich or pro-wealth inequality between 2005 and 2008 for any indicator, apart from a small reduction in pro-wealthy inequality for tertiary hospital visits in probability, but on several indicators there was an apparent reduction in pro-educated inequality.

Conclusions

There is substantial socioeconomic inequity in health care in Korea for services not fully covered by the National Health Insurance program, with similar patterns of inequity for pro-rich, pro-wealthy and pro-educated dimensions of socioeconomic status. There was no reduction in pro-rich or pro-wealthy inequity in health care between 2005 an 2008. There were signs of a reduction in pro-educated inequality but this may just be a statistical artefact of sample attrition due to confounding between birth cohort and education group.

Korea continues to have higher out-of-pocket expenditure and larger socioeconomic inequalities in health care than most other high income OECD countries, despite the health benefit expansion policy of 2006.

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Acknowledgement

Author's Declaration

I hereby declare that I am the sole author of this thesis and the work contained in this thesis has not previously been published. Dr. Richard Cookson mainly supervised this thesis together with Dr. Karen Bloor.

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Chapter I: Introduction

1.1 Background and Research Questions

Equity in health care utilisation has long been regarded as an important element of health care system performance. In line with this, the governments of many economically developed countries have adopted equity as one of their primary health policy goals, providing comprehensive universal health care coverage to their people (NHS, n.d.; WHO, 2008). The majority of health care expenditure is financed through general revenue or social insurance funds in an attempt to minimize financial barriers to the use of essential health care services, especially for the disadvantaged. In spite of this effort, considerable socioeconomic-related inequalities in health care utilisation have been reported among high income countries. However, within high income countries, the degree of socioeconomic-related inequality in health and health care utilisation appears to be largely independent of national wealth. There is no sign of a simple causal relationship between whereby rising national income causes falling socioeconomic inequality in either health or health care; and growth in both national income and public expenditure on health care in all OECD countries in recent decades has not eliminated socioeconomic inequality in either health or health care. Rather, equity in health and health care appear to result from a complicated combination of social, economic and institutional factors that influence health behaviours and decision making on the use of health care (Graham, 2009). Understanding these complex factors requires social policy perspectives as well as narrower financial or economic explanations. (Hurrelmann et al. 2011; Navarro et al., 2006).

South Korea (hereinafter Korea) achieved a universal health care system (Korean National Health Insurance, hereinafter KNHI) in 1989, within 12 years of its initial implementation. Thanks to economic growth and universal health coverage, health outcomes and access to health care services have been greatly improved in Korea. However, the minimum role of the government in health care financing and high dependency of health care delivery on the private sector have resulted in relatively high out-of-pocket (OOP) payments that may serve as a serious barrier to equal access to essential health care services. On top of this, hospitals mostly owned by the private sector are encouraged to provide more services-- sometimes unnecessary-- to patients based on the fee-for-service (FFS) payment system. To maximize profits, both private for-profit and private nonprofit hospitals compete with

each other by equipping themselves with luxury medical technologies, in order to attract more patients who have an unlimited choice of hospitals without any official gatekeeping. To sum up, health care in Korea is market-oriented, in terms of competition, choice and private hospital ownership, although the KNHI program has played an important role in the financing and delivery of health care.

Interestingly, despite relatively low public spending and relatively high OOP payments for health care[1], key indicators of health status in Korea are shown to be higher than the OECD averages [Table 1.1]. However, recent studies in Korea also reported that there exist substantial health and health care inequalities across the different socioeconomic groups, as well summarized in Chapter 5. While those on low incomes are more likely to have higher rates of morbidity and mortality due to chronic diseases and cancers, their utilisation of health care services, in terms of intensity, is lower than that of those on high incomes. Therefore, it can be said that the high OOP payment rate is one of the major contributors to the current unequal utilisation in health care services in Korea.

The recent Health Care Reform proposal in Korea includes deregulation of hospital ownership and industrialization of health care services for exporting[2] which may reinforce the marketized characteristics of health care in Korea through severe competition and 'arm races' in order to maximize the profits of investor-owned hospitals. Neo-liberal governments, like Korea, have a tendency to transfer their responsibilities for decision-making on health care rationing to private sectors in the name of increasing efficiency. However, there is little evidence about the effects of market-oriented health care reforms on efficiency and average outcomes; and still less evidence about the effects on health care

[TABLE 1.1] HEALTH STATUS IN KOREA AND THE UK, 2007

Country	Life Expectancy	Infant Mortality Rate (per 1,000 live births)	Cancer Mortality Rate* (per 100,000 population)
Korea	80.4	3.5	142.9
UK	80.4	4.6	165.6
OECD Average	79.5	4.4	158.5

Source: OECE Health Data (2011)
* Age-standardized rates per 100,000 population

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[1] See [Appendix 1] for "Expenditure on Health by Type of Financing among OECD Countries"
[2] The Korean government plans to export their health care services through attracting foreign patients with high quality of medical care and facilities as well as launching franchise hospital facilities in other Asian countries.

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equity (Cookson, Laudicella, & Donni, 2013). There are concerns, however, that market reforms may exacerbate inequalities in health care due to socioeconomic inequalities in information capacity and ability to pay (Burstrom, 2009; Masseria, 2007).

Economic growth in Korea in recent decades has been accompanied by rising inequality in income and wealth (OECD, 2012b). Equality in the distribution of wealth has thus emerged as an important social policy agenda in Korea, although. The current neo-liberal government still sets a policy priority of economic growth rather than equal distribution of wealth. As a result, general social equality indicators within Korea, such as measures of income inequality, gender inequality, working conditions and social investment, place Korea in the lowest ranks among the OECD countries[3].

On the other hand, the government has attempted to expand health care benefit coverage to enhance access to health care more equally since 2006, as described later in the thesis. This benefit coverage expansion policy will be expected to be expanded in the next government.

For the reason above, this thesis will focus on inequity in health care utilisation, in relation to multiple dimensions of income, wealth and education and the inequity changes caused by the policy implementation in Korea. For the analysis, the Korea Welfare Panel Study (KOWEPS) which has a wide range of socioeconomic variables will be employed. The rich information of the KOWEPS data enables to measure inequity in health care utilisation with multiple SES dimensions. The KOWEPS data has been rarely used for the equity analysis in health care utilisation yet; furthermore, publication in English language using the KOWEPS is few.

The purpose of this study is to investigate inequity in health care utilisation in Korea with the income, wealth and education dimensions and the inequity changes between before and after the implementation of the health care benefit expansion policy in 2006. The following are the research questions of the study.

1. Is there socioeconomic inequity in health care utilisation in Korea?
2. Does inequity in health care utilisation vary by different socioeconomic dimension (income, wealth and education)?

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[3] See [Figure 5.1] & [Figure 5.2] in Chapter 5.

3. Has socioeconomic inequity in health care utilisation been changed between 2005 and 2008?

1.2 Outline of the Thesis

The current introduction chapter is followed by three main parts consisting: 1) literature review; 2) equity in health and health care in Korea; and 3) empirical analysis of socioeconomic inequity in health care in Korea.

The first part has two chapters reviewing methodology and international empirical studies on health care utilisation. More specifically, Chapter 2 reviews scientific methods of measuring horizontal equity in health care including the Le Grand index and the Horizontal Inequity (HIwv) index based on the concentration curve and index. Chapter 3 reviews the empirical studies on equity in health care utilisation diverged from the ECuity project among the European countries as well as other countries than Europe with the approaches of comparative analysis for multiple countries and single country analysis.

The second part consisting of two chapters describes the general health policy and the current status of equity in health and health care in Korea. Chapter 4 depicts the evolvement of the Korean National Health Insurance (KNHI) system and deals with the current issues in relation to the impact on inequity in health care in Korea. Chapter 5 reviews previous studies of equity in health outcomes, health care financing, health care utilisation, and private health insurance in Korea.

The third and most important part of the thesis is devoted to empirical analysis of socioeconomic inequity in health care utilisation in Korea. Prior to the main analysis, Chapter 6 provides the detailed information of the data-- the 1st and the 4th waves of the Korea Welfare Panel Study (KOWEPS) -- and the variables interested used for the present study. Also, the equations for measuring horizontal equity and standardizing health care need in are explained. Chapter 7 examines the existence and magnitude of inequity in health care utilisation in 2008, in terms of the three socioeconomic dimensions-- income, wealth and education-- with the HI*wv*/Erreygers indices and the extreme group inequality indices. Chapter 8 then examines demonstrates the magnitudes of inequity in health care

utilisation with the three socioeconomic dimensions both in 2005 and 2008 and their inequity changes along with the explanation of the relevant policy changes.

Finally, Chapter 9 concludes with a social policy discussion of inequity in health care utilisation in Korea based on the current health care systems and the empirical studies of the previous chapters, with a view to drawing policy implications for the future improvement of equity in health care utilisation. In addition, study strengths/limitations and suggestions for further studies are provided.

Part I   Literature Review

Chapter 2: Methods for Measuring Equity in Health Care

2.1   Introduction

This chapter reviews methods for analysing SES-related inequity in health care. It focuses on the standard concentration index approach, including recently proposed "corrections" to the concentration index when the health care dependent variable is binary in nature or has an upper bound. However, I also review the Le Grand index -- a precursor to the concentration index approach, which helps shed light on its nature and rationale.

In the main empirical analysis of the thesis, I also conduct supplementary analysis using simple absolute and relative gap measures based on ratios and differences between two SES groups. Absolute and relative gap measures are more limited than the concentration index approach, since they only focus on one selected part of the distribution and can give misleading results. However, when judiciously used alongside a more general concentration index approach, they can be a useful aid in helping decision makers to interpret the magnitude and importance of health care inequity.

All of these methods can be thought of as "bivariate" methods, since they focus on two main variables of interest: a health care dependent variable and a single SES ranking variable (e.g. income) deemed to represent an unfair resource of health care inequality. I do not review "multivariate" methods for assessing overall health care inequity, which analyse inequity associated with multiple social variables that may be deemed to represent unfair sources of inequality (e,g. income, gender, ethnicity, location, etc.). This is because the focus of the thesis empirical work is on SES-related inequity in health care, rather than overall inequity.

2.2   Measures of Equity in Health Care

2.2.1 The Lorenz Curve and the Gini Coefficient

The Lorenz curve is a graphical representation mainly employed in the field of income inequality analysis demonstrating the distribution of income or wealth across the population. The cumulative share of population ranked by income (or wealth) level is plotted on the x-

[FIGURE 2.1] THE LORENZ CURVE
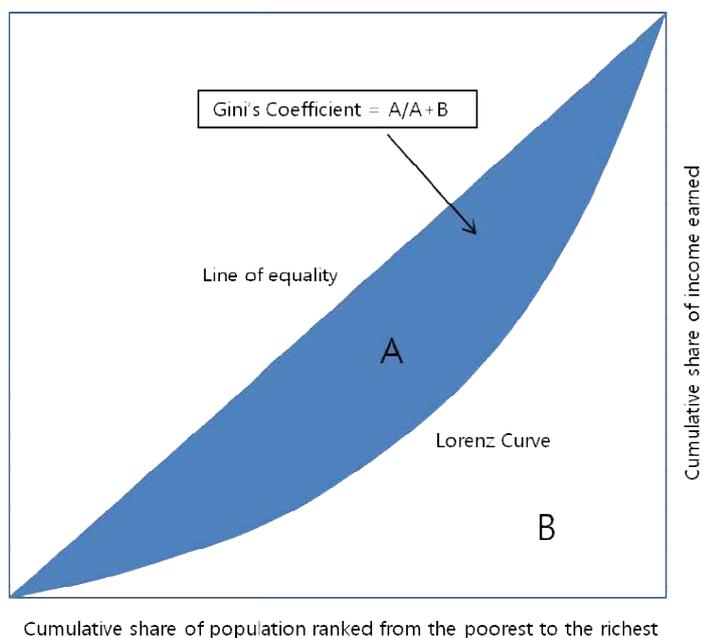
axis while the cumulative share of income (or wealth) level is plotted on the y-axis of the Lorenz curve. The curve is interpreted as indicating that the bottom of x% the total population have y% of the total income (or wealth). The diagonal line (45°)-- when the values of x are the same as the values of y-- means the line of equality.

As both axes are plotted based on the same indicator (e.g. households income), the Lorenz curve by definition cannot go above the line of equality. The closer the curve gets to the line of equality, the more equal the distribution. The Gini Coefficient is a quantified index based on the Lorenz curve, dividing area between the line of equality and the Lorenz curve (A) by the total area of the triangle below the line of equality (A+B) [Figure 2.1]. The index ranges between 0 and 1, and 0 means perfect equality of income distribution while 1 the perfect inequality-- the richest individual receives the total income of the society.

2.2.2 The Concentration Curve and the Index

In the health sector, the concentration curve is an extended version of the Lorenz curve that plots the cumulative share of health outcomes or health care utilisation (on the y-axis) against the fractional rank of population ranked by socioeconomic status (on the x-axis) (O'Donnell et al., 2008a). Different from the Lorenz curve, both axes for the concentration curve carry different variables (health or health care vs. socioeconomic variable). Hence, the concentration curve can be drawn either above or below the line of equality and so

[Figure 2.2] Concentration Curve

[FIGURE 2.2] CONCENTRATION CURVE
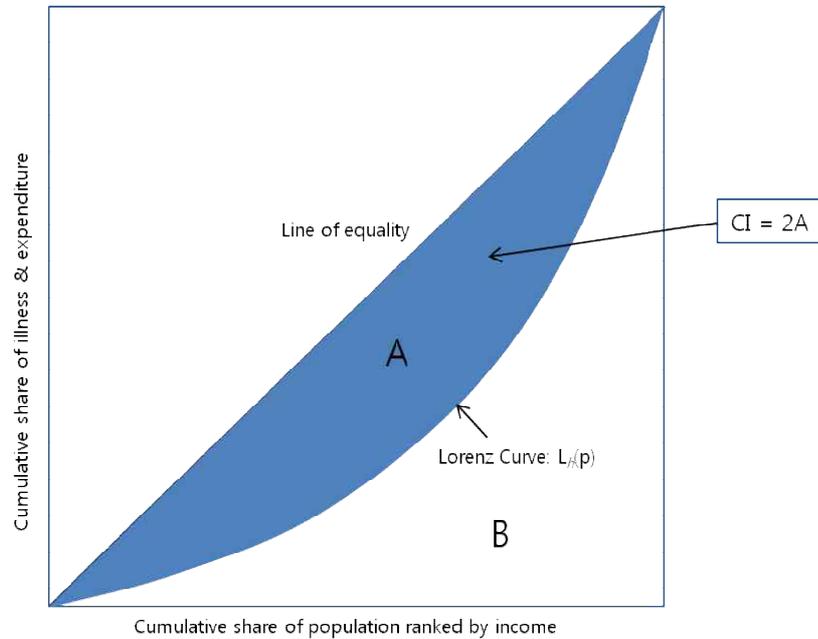
health care inequality can in theory be either pro-rich or pro-poor. When the curve is placed below the line of equality, it means that the distribution of health outcome or health care utilisation favours the rich.

The concentration index is also calculated based on the concentration curve, doubling the area between the line of equality and the concentration curve, and the index ranges from -1 to 1 [Figure 2.2]. The positive value of the index indicates that the variable related to health outcomes or health care utilisation is more concentrated on the high SES groups. In accordance with the concept of the concentration index (CI) described, the formula is:

$$CI = 2A = 2(0.5 - B) = 1 - 2B = 1 - 2\int_{0}^{1} L_h(p)dp$$

Equivalently[4], including the SES variable with fractional rank,

$$CI = \frac{2}{n\mu}\sum_{i=1}^{n} h_i r_j - 1 - \frac{1}{n}$$

or a more convenient regression expression with covariance is as below;

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[4] Where n is sample size, h is the health variable, μ is the mean of health variable, and r is the rank variable.

$$CI = \frac{2}{\mu} \text{cov}(h, r)$$

The detailed formulae of concentration index will be explained in Chapter 6: Methodology. Like the Gini Coefficient, the concentration index is calculated based on the concentration curve: 1) to quantify the magnitude of inequity in health outcome or health care utilisation in accordance with a socioeconomic status and; 2) to compare the curves crossing each other that make difficult to compare with only graphical representation (O'Donnell et al., 2008a).

2.2.2 Correction of Concentration Index

Although concentration index is widely used to measure inequity in health and health care across the population, it should be carefully applied depending on the types of dependent variables. In theory, the dependent variables must be continuous and unbounded for analysis with concentration indices. However, the majority of dependent health and health care variables are binary (0, 1) or bounded (Erreygers, 2009; Kjellsson & Gerdtham, 2013). Recently, corrections to concentration curves have been proposed by some health economists due to the issues below:

1) As the bounds of concentration index vary by the mean value of health and health care, comparing groups with different mean values is not appropriate (Wagstaff, 2005);

2) The ordering method by health or ill-health creates different rankings (Clarke et al, 2002); and

3) The value of the concentration index may depend arbitrary on the scale used for measuring the dependent variable of health or health care (Erreygers, 2009).

In order to address the problems enumerated, Wagstaff (2005)[5], Clarke et al. (2002)[6] and Erreygers (2009) have suggested several versions of corrected concentration index. Among them, the versions of Erreygers (2009) & Wagstaff (2005) are generally regarded as the

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[5] Wagstaff (2005)'s normalized concentration index (W): When the dependent variable is binary, dividing the concentration index by $(1 - U_h)$ to solve the bounds problem.

[6] Clarke et al. (2002)'s generalized concentration index (V): The index is dealing with the health/ill health issue and the index is obtained by multiplying the concentration index by the average health level (U_h).

most useful methods. In particular, the version of Erreygers (2009) is the most popular as it satisfies the four key requirements[7] of a corrected concentration index comprehensively for addressing the problems listed above while other versions do partly. The Erreygers Concentration Index (EI) can be computed based on the traditional concentration index (CI) as below:

$$EI(h) = \frac{4\bar{h}}{h^{m\ ax} - h^{m\ in}} \times CI(h)$$

where $\bar{h}$ is the mean health care utilisation and $h^{m\ ax}$ and $h^{m\ in}$ are the maximum and minimum possible values of health care utilisation. While the traditional CI is a measure of relative inequality, the corrected EI measures "quasi-absolute inequalities" as the index is translation invariant: it does not vary if you add the same constant to every individual's health care utilisation (Erreygers, Clarke, & Van Ourti, 2012; Hernández-Quevedo & Masseria, 2013). The range of the EI is same as for the CI, i.e. from -1 to 1, where 1 represents perfect pro-advantaged inequality, 0 represents on inequality, and -1 represents perfect pro-disadvantaged inequality.

The empirical analysis of this thesis employs both methods for calculating concentration indices as follow:

1) traditional concentration indices (HIwv) for health care utilisation in total number; and

2) corrected Erreygers concentration indices (EI) for health care utilisation in probability (binary variables).

It is not appropriate or indeed possible to use the Erreygers index for health care expenditure and other health care utilisation variables involving total numbers, since these variables have no theoretical upper bound and hence one of the key parameters-- $h^{m\ ax}$-- is undefined. This approach does not have the drawback, however, that the traditional concentration indices for indicators based on total utilisation are not comparable with the

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[7] Four key requirements: "1) transfer- a small transfer of health from a richer (poorer) to a poorer (richer) individual translates into a pro-poor(pro-rich) change of the index"; 2) mirror: the inequality indices of health and ill-health should be mirror images of each other, i.e. I(h) are equal to the absolute value of I(1-h), but has the opposite sign; 3) level independence: an equal increment of health for all individuals does not affect the index; that is, the index is invariant to scalar addition even when the bounds of the variable are kept constant; and 4) cardinal invariance: a linear transformation of the health variables, hi, does not affect the value of the index; that is, the measured degree of inequalities is the same, irrespective of the cardinal scale of the health variable (e.g. I[h] of body temperature would be the same whether measured in Celsius or Fahrenheit)" (Kjellsson et al., 2013, pp.3).

Erreygers indices for indicators based on binary variables. To help make these comparisons, I use absolute and relative gap measures which also have the advantage that they are generally easier for decision makers to interpret.

2.3 Measuring Socioeconomic Equity

2.3.1 Need-standardized Health Care Utilisation

As defined by a number of scholars (Wagstaff & van Doorslaer, 1998; O'Donnell et al., 2008a), horizontal equity of health care utilisation means "equal treatment for equal health care need." A key issue when analysing socioeconomic related inequity in health care, therefore, is allowing appropriately for differences in health care needs between individuals with different socioeconomic status. Although individuals in low income groups may use more health care services than those in high income groups, they may also have higher health care needs. For this reason, it is necessary to standardize variables of health care need in order to observe the impact of socioeconomic factors on inequity in health care utilisation more clearly. Therefore, several approaches for measuring inequity in health care utilisation using need standardization method with the concentration index will be reviewed in this section.

2.3.2 Le Grand Approach: Horizontal Equity Index of Le Grand (HI$_{LG}$)

The Le Grand index (HI$_{LG}$) measures a distribution gap between illness and health care expenditure across the income groups. The proxy variables of need for the Le Grand Index are acute and chronic diseases, and for health care utilisation is health care expenditure. The index is computed by: 1) dividing the total expenditure by the number of people who reported their diseases by income group; 2) calculating the ratio of each group's expenditure to the total expenditure and the ratio of each group's diseases reported to the total disease reported; and 3) subtracting the concentration indices produced from the two ratios of disease (need) and expenditure (utilisation) [Figure 2.3]. This calculation is also expressed as:

$$HI_{LG} = CI_{epx} - CI_{ill}$$

[FIGURE 2.3] LE GRAND INDEX (HI$_{LG}$)
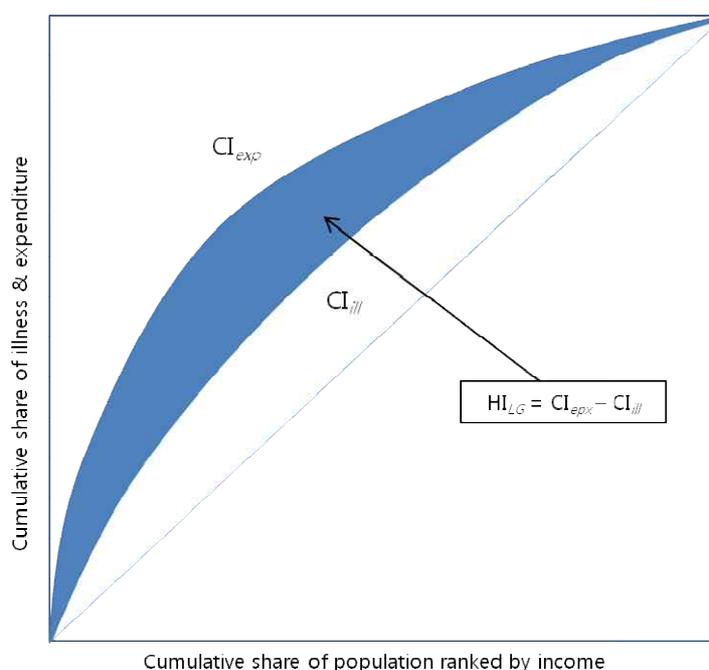
The Le Grand index is ranged from -2 to 2, and any positive value indicates pro-rich (while negative value indicates pro-poor) inequity in health care utilisation.

Although the Le Grand index enables to compare inequity in health care utilisation across the SES groups with a single index, it has a number of biased assumptions as following: 1) the individuals reporting diseases have the same degrees of need for health care; 2) each socioeconomic group has the same demographic characteristics that may lead to different levels of health care utilisation; and 3) only sick individuals use health care. Due to the third assumption, the Le Grand index is more likely to detect pro-rich inequity in an equitable health care system if the system allows non-sick individuals to receive health care (Wagstaff et al., 1991c). The method to overcome the shortcomings is suggested by Wagstaff et al.(2000; 1991c) and the most frequently used method is explained in the next section.

2.3.3 Regression-based Need-standardized Horizontal Inequity Index (HI$_{wv}$)

The Horizontal Inequity (HIwv) Index is a regression based analysis to measure inequity in health care utilisation after standardizing need suggested by Wagstaff & van Doorslaer (2000a). There are two different ways to standardize health care need-- direct and indirect

[FIGURE 2.4] HORIZONTAL INEQUITY INDEX (HIwv)
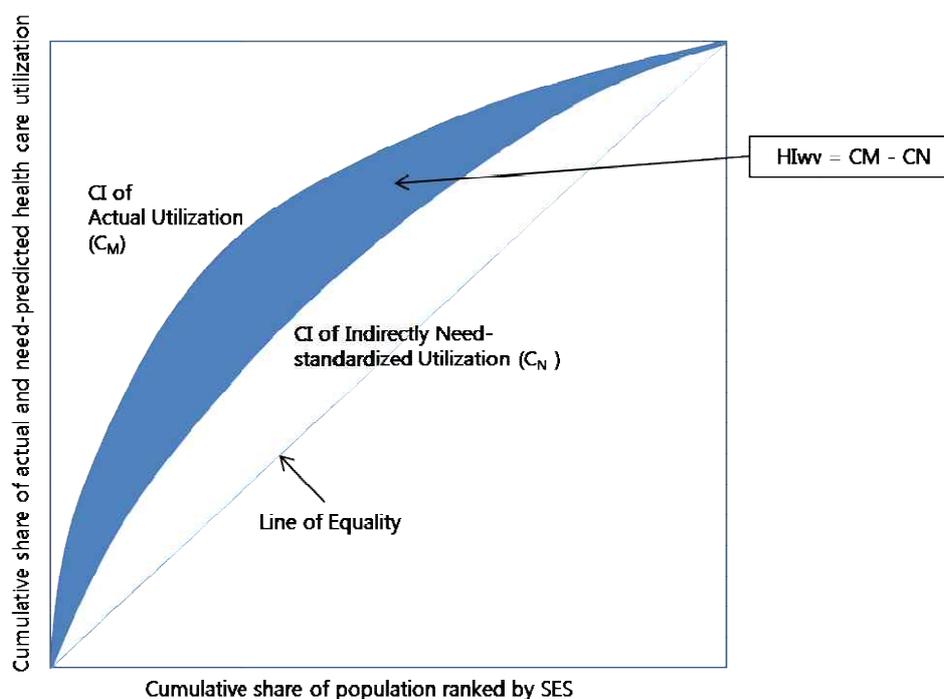
methods. The direct-standardization method (HI*wvp*) enables the observation of health care utilisation distributed across the SES groups under the condition of the same need (age, gender and health status) structure, but with group-specific intercepts and age effects. On the other hand, the indirect need-standardization method (HI*wv*) corrects actual health care utilisation with the original values of individuals' need variables, but the same mean age effect of the total population. However, the indirect need-standardization method is preferable when using a micro level household data because the direct need-standardization method ignores the within group variance of need variables. The process of calculating the HI*wv* index through indirect need-standardization is as follows:

- Compute individuals' actual health care utilisation by SES group;

- Produce need-predicted health care utilisation after controlling for age, gender and health status by SES group;

- Calculate the mean value of need-predicted health care utilisation; Indirectly calculate the need-standardized health care utilisation of individuals by deducting need-predicted health care utilisation from actual health care utilisation, then add the mean value of need-predicted health care utilisation;

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- Compute the concentration indices for both actual and indirectly need-standardized health care utilisation using OLS regression; and then

- Finally, produce the HIwv index as calculating the gap between the two concentration indices [Figure 2.4].

The HIwv index calculates the difference between two concentration indices, so that the range of the index is from -2 to 2, being interpreted as any positive value indicating pro-rich inequity (and negative value indicating poor) in the use of health care. More specific calculation method and mathematical expressions for the presenting study are explained in Chapter 6: Methodology.

The HIwv index with the indirect-standardization method overcomes the most important shortcomings of the Le Grand Index. It 1) enables to demonstrate the distribution of health care utilisation across the SES groups while considering the differences between the SES groups; and 2) allows for health care utilisation by non-sick individuals by specifying the need variables. However, a shortcoming of the HIwv index is the difficulty in obtaining rich data on the magnitude of health status that enables sophisticated standardization of need.

2.4 Summary

The standard approach to analysing socioeconomic related inequity in health care utilisation is to use concentration curves and their indices based on the Lorenz curve from the area of economics. The indirect need-standardization method for capturing unfair inequality caused by socioeconomic factors, after taking account for different need by SES group, is superior to the method of simply comparing the differences between SES groups which can be misleading as it requires the selection of particular groups. However, although the concentration index approach provides a useful set of tools for comparing inequality and conducting statistical tests, it can be hard for decision makers to interpret the magnitude of a concentration index. Judicious use of simple "extreme group" comparisons in terms of absolute and relative gaps can therefore be a useful supplement to concentration index analysis.

Chapter 3: Empirical Evidence of Equity in Health Care- International Perspectives

3.1   Introduction

Many European countries have seen a growth in the health care industry through the expansion of universal and comprehensive public health care systems since World War II, and this has enhanced overall access to health care greatly among the countries (Gauld & Uchida, 2011; Saltman, Figueras, & Busse, 2004). Despite the enhanced access to health care, some European countries have reported having health inequity, mainly caused by socioeconomic strain in Europe, in particular by the government of the UK[8]. Based on the significance of the inequalities in health, governments and international organizations began to promote research projects on equalities and equities of health and health care. In particular, the "ECuity Project" funded by European Union (EU) carries out outstanding studies on inequalities and inequities of health care finance, health care utilisation and health outcomes for analyzing current status, developing methodologies and providing policy insights in order to alleviate inequity in the health and health care sector.

Based on the studies mainly achieved by the ECuity Project, this chapter will review: 1) the empirical studies on horizontal equity in health care utilisation among European countries based on the results of the ECuity project; and 2) the empirical studies on horizontal equity in health care utilisation among the countries other than European countries with the identical method developed by the project.

3.2   ECuity Project

Prior to reviewing the relevant literature on horizontal equity in health care utilisation, the ECuity project will be briefly introduced for information in this section. The purpose of the ECuity project discussion is to compare inequalities and inequities in health and health care in terms of finance, health care utilisation and health outcomes across the EU countries, such as Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands,

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[8] For example, The Black Report in 1982, The Whitehead Report in 1987, The Acheson Report in 1998 and the Marmot Review in 2010.

Spain, Sweden, and UK. In addition, Norway, Switzerland and U.S. participated in the project("ECuity Project,").

With regard to equity in health care finance, this project compares the degrees of inequity as measuring progressivity or regressivity of health care financing by funding source among the European countries. In case of health care utilisation, the project investigates whether: 1) horizontal equity in health care -- equal treatment for equal need-- is achieved within a country: 2) there are differences in the level of inequity in health care utilisation between the countries; and 3) there are policy impacts on the degree of inequity in health care for each country. For inequalities in health outcomes, the project also attempts to confirm: 1) whether there are socioeconomic status related inequalities within a country; 2) whether there are differences in the degrees of inequalities between the countries; and 3) the socioeconomic determinants of health inequalities.

The project provides sophisticated and comprehensive definitions and measures related to inequity in health and health care based on the academic discussions with scholars from diverse disciplines, such as the areas of philosophy, social policy, economics, etc. ("ECuity Project"). As a result, the volume as well as quality of the project outcomes appears very successful, and the methods developed by this project are widely used for measuring inequity in health and health care among the countries beyond Europe.

3.3 Income-related Equity in Health Care in European Countries

3.3.1 Income-related Equity in Health Care: Comparative Approach

Van Doorslaer, Koolman & Puffer's study (OECD, 2003), titled "Equity in the Use of Physician Visits in OECD Countries: Has Equal Treatment for Equal Need Been Achieved?" is a comprehensive comparative study on horizontal equity in health care among European countries and the U.S. using the HI*wv* index[9] that was developed by Wagstaff et al. (2000). This comparative study investigates horizontal inequity in the use of general practitioners (GPs) and specialists with the three different household survey data in 1996-- European Community Household Panel (ECHP, European Countries), National Population Health Survey (NPHS, Canada), and Medical Expenditure Panel Survey (MEPS,

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[9] The HI*wv* index is the Horizontal Inequity (HI) index with the indirect need-standardization method.

the US). In case of the U.S., only aggregate health care utilisation information (total physician visits) is available. The mean numbers of GP visits vary from 2.1 visits per year in Greece to 5.39 visits in Austria in the study. This study shows that the HIwv indices for GP visits of Spain (-0.0437), Ireland (-0.0430), Luxembourg (-0.0324) and Italy (-0.0277) indicate pro-poor inequity, while the indices of Portugal (0.0146) and Austria (0.0178) indicate pro-rich inequity. In case of specialist visits, the mean numbers of visits vary from 0.62 visit per year in Ireland to 3.29 visits in Germany. The specialist visits shows slight pro-rich inequity among most countries, but very strong pro-rich inequity is found in Ireland (0.1496) and Portugal (0.1904). However, Luxembourg (-0.0041) is the only country shows very slight pro-poor inequity-- which is almost fair -- in the use of specialists. In case of Luxembourg, all types of health care utilisation show pro-poor inequity, while most types of health care services in Portugal are utilized in favour of the richer. In Ireland, GP visits are utilized in favour of the poorer while specialist visits show pro-rich inequity. In particular, the degrees of inequity in the use of total physician visits, which is the aggregate measure of utilisation, are compared between the countries including the US. The total physician visits show somewhat pro-rich inequity among Greece (0.0273), Austria (0.0403), the US (0.0550) and Portugal (0.0635). However, inequity in the use of aggregate utilisation does not consider intensity or quality of care and the patterns and degrees of inequity in aggregate utilisation are different from those of specified utilisation. This study is meaningful in some respects in that: 1) it employs more harmonized household survey data from European countries, Canada and the US for measuring inequity in health care utilisation; and 2) it finds the two-tiered patterns of inequity in health care utilisation, which is pro-poor inequity or fair utilisation for GP visits but pro-rich inequity for specialist visits although; all countries, except the US, have achieved comprehensive universal health care systems. Nevertheless, this study fails to reveal the sources of income-related inequity-- whether it comes from fair differences, such as choice or preferences among the different income groups, or from unfair causes, such as asymmetric information or costs.

Van Doorslear, Koolman, & Jones (2004) conducts a similar study targeted for the twelve EU countries, titled "Explaining Income-related Inequalities in Doctor Utilisation in Europe." The data as well as the measure used are identical to the previous study above; however, this study carries out some additional analyses as follows: 1) use probability utilisation for measuring the HIwv indices; and 2) use decomposition analysis to elucidate

the sources of horizontal inequity. In general, the patterns of horizontal inequity in GP and specialist visits are quite consistent with the previous study (OECD, 2003) among the countries. The interesting findings from this study are that the main sources to contributing to pro-poor inequity in the use of GP services are low education, retirement, and non-participation in the labour force, rather than low income while the main sources to contributing to pro-rich inequity in the use of specialist services are income and higher education. In particular, the countries with more frequent use of supplemental private health insurance (Ireland, Spain, and the UK) or with more health care service provision from the private sector (Portugal and Italy) are strongly influenced by income for reinforcing pro-rich inequity in specialist service utilisation. This study concludes that the health care systems among European countries with universal and relatively comprehensive health care coverage do not satisfy horizontal equity in the use of specialist services, and this tendency is stronger among countries with more private options.

As an extension of the earlier studies reviewed in this section, van Doorslaer, Masseria & their OECD colleagues (2004) conduct a study with updated household survey data and methods, titled "Income-related Inequality in the Use of Medical Care in 21 OECD Countries." Seventeen European countries-- Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK-- US, Canada, Australia and Mexico are included in this study. It compares the degrees and the sources of horizontal inequity among them with the HIwv index and the decomposition analysis. Horizontal inequity with various types of health care services, such as GP visits, specialists visits, total physician visits, inpatient care and dental care, are measured in total number as well as probability. The major findings of this study are as follows: 1) the actual GP services are more utilized by the lower income groups, except Finland, and overall need-standardized GP utilisation shows fair or pro-poor inequity across the countries; 2) the actual use of specialist services is almost equal or slightly concentrated on the poorer income groups while the need-standardized use of specialists services indicates pro-rich inequity among the majority of the countries; 3) in case of inpatient care, the overall degrees of pro-rich inequity are smaller than those of specialists visits—but considerably higher pro-rich inequity in Mexico and Portugal--, but the data is incomplete to confirm the result; 4) dental care utilisation shows high pro-rich inequity across the countries; however, the countries with lower dental care utilisation indicate higher pro-rich inequity; and 5) the main socioeconomic sources of horizontal

inequity are income and education; however, education contributes more to pro-rich inequity than income, while the employment status serves as the largest contributor to pro-poor inequity. The authors conclude that the countries included in this study show pro-rich inequity in the use of specialist and dental care services, although they have been equipped with well established comprehensive health care systems, except the US. In particular, Portugal, Ireland and Finland have higher overall pro-rich inequity in health care utilisation and the authors attribute the causes to their unique health care systems, such as a two-tiered public/private health care system in Ireland, high out-of-pocket payment and unequal distribution of specialist services in Portugal and high out-of-pocket and private sector options in Finland. Although this study shows results based on comparable national household survey data, it reveals some limitations due to the incompleteness of self-administered or interviewed household survey data, which do not take account of health care utilisation with different quality, time appropriateness of care, reliable variables to substitute self-assessed health, etc. For these reasons, the attempt to explain horizontal inequity in health care utilisation and its causes in relation to each country's health policy need to be elaborated with deeper understanding of the pertinent health care system in a country or a region.

A more focused study on horizontal equity in the use of inpatient care among European countries is carried out by Masseria, Koolman & van Doorslaer (2004), in the study titled "Equity in the Delivery of Inpatient Care in the European Union: A Pooled Analysis." This study includes Austria, Belgium, Denmark, Italy, France, Germany, Greece, Ireland, Netherlands, Portugal, Spain and UK, and utilizes a pooled data of ECHP for 5 years from 1994 to 1998. The purpose of using a pooled data for 5 year is to increase the estimation power of the study result. The study finds that both hospital admissions and specialist visits tend to be utilized more by the higher income groups if their needs are equal. In case of hospital admissions, the majority of the countries show pro-rich inequity, except Belgium, Netherlands, and UK. For specialist visits, all the countries included in this study have pro-rich inequity, particularly Austria, Ireland and Portugal show stronger pro-rich inequity in specialist visits. The interesting finding of this study is that there is a positive relationship between the level of horizontal inequity to hospital admission and the use of specialist services. The authors explain that the positive relationship is possible because most inpatient cases are generally made by specialists' referrals in Europe. The more educated individuals have higher probability of seeing specialists that may lead to hospital

admissions. This study also calls for attention to health care system or policy impacts on horizontal inequity in health care utilisation. Different combination of health care financing, payment system, mixture of public/private service provisions, gatekeeping system, and disparity of service provision by region may cause horizontal inequity in health care utilisation.

Earlier studies than those reviewed in this section also compare horizontal inequity in health care utilisation with both HI*wvp* (direct need-standardization) and HI*wv* (indirect need-standardization), focusing more on methodological discussions. For example, the study titled "Equity in the Delivery of Health Care: Some International Comparisons" done by van Doorslaer & Wagstaff (1992) illustrates the possibility of the variations of the HI*wvp* indices led by selection and combination of variables for need-standardization. More specifically, when an analysis includes more need variables for need-standardization, such as SAH and chronic illness together, the indices show less pro-poor distribution or more pro-rich distribution as low incomes are more likely to have multiple disease conditions to be taken into account.

3.3.2 Income-related Equity in Health Care: Single Country Analysis

Many European countries conducted studies on horizontal equity independently, considering their own issues in health care. Although the household survey data they employed are less harmonized than those used for international comparisons, the studies of single countries are still comparable with each other as they measure horizontal inequity in health care using the same HI indices.

In Italy, Masseria (2003) conducts a study titled "Equity in the Delivery of Inpatient Care in Italy," using the Multiscopo Italian Survey (1999-2000), which is a national health data that combines the Eurostat Survey to match the income information to the health care data. Due to the limitation of inpatient care data, the author calculates the HI*wv* indices of a projected long-term utilisation (for one year) based on chronic conditions as well as three month inpatient care utilisation, which comes directly from the Multiscopo Italian Survey. The results estimate that the HI*wv* index for the short term use shows slightly pro-poor inequity (-0.011), while the estimated HI*wv* index for inpatient admissions for one year indicates pro-rich inequity (0.013). In addition, the disparities of the HI*wv* indices between regions are significant in relation to the shortage of specialist and hospital services in the Southern part of Italy. However, inconsistent with the finding from a similar study done by

Masseria et al. (2004), this study finds insignificant relationship between the use of specialist services and hospital admissions. Although Masseria's study (2003) shows the disparities of horizontal inequity within Italy well, a more clear conclusions can be drawn with a higher quality of data set.

In the case of Ireland, the authors of a study titled "Equity in the Utilisation of Health Care in Ireland" (Layte & Nolan, 2004) utilize the Living in Ireland Survey. This study found that all types of health care services including GP visits are utilized in favour of the higher income groups. The authors explain that the causes of horizontal inequity in Ireland are due to financial barriers, such as high copayment, as well as non-financial barriers, such as long waiting list and inconvenience to travel for services.

A study conducted by van Doorslaer, Buytendijk & Geurts (2001) measures horizontal inequities of the two countries, Belgium and Netherlands, which are similar in population sizes as well as health care systems. The authors utilize the comparable Health Interview Surveys (1997) from each country and measure the HIwv indices for GP visits, specialist visits, and inpatient care services. The mean number of health care utilisation is higher in Belgium than those in the Netherlands; however, the degrees of pro-poor inequity in health care utilisation are larger in the Netherlands. For GP visits, Belgium shows slight pro-rich inequity (0.0114), while the Netherlands indicates almost fair utilisation (-0.0011). In case of specialist visits, the higher income groups are more likely to use the services (0.0867, 0.0673) than the lower income groups if their health care need is equal. For inpatient care services, the tendency of pro-poor inequity is stronger in the Netherlands than in Belgium. The study finds that Belgium shows a stronger pro-rich inequity in most types of health care services than in the Netherlands, particularly the services entails high out-of-pocket payments caused by fee-for-service payment system.

The impact of high copayments on the tendency of pro-rich inequity in health care utilisations in Denmark is shown in the study, titled "Income-related Inequality in Utilisation of Health Services in Demark: Evidence from Funen County" by Gundgaard (2006). The author employs the Health Survey of Funen County of 2000 and 2001 and measures the HIwv indices for inpatient care, GP visits, specialist visits, ambulatory visits, prescription medicines and dental care. The overall income-related inequity in health care utilisation in Funen County is fair; however, the authors explain that the cause of pro-rich inequity in certain health care services, such as prescription medicines (0.0940) and dental

care (0.0837), is high copayments at the point of services use.

Allin, Masseria and Mossialos (2006) conducted a study of inequity in health care utilisation that focused on the older population over 65, titled "Inequality in Health Care Use among Older People in the United Kingdom: An Analysis of Panel Data." The authors use the British Household Panel Survey (BHPS, 1997-2003) and measured the HI*wv* indices for GP visits, inpatient care, outpatient care and dental care. The authors found that all the types of health care utilisation, except GP visits (0.0011), show pro-rich inequity. Compared to the previous study by van Doorslaer & Masseria (2004), this finding shows that the tendency of pro-rich inequity in health care utilisation among the older population is stronger than that of all age groups, at least in the UK.

3.4   Equity in Health Care among the Countries other than European Countries

This section will review the studies on horizontal inequity in health care utilisation conducted among the countries other than European countries, such as Canada, Austria and a couple of Asian countries.

In case of Canada, Allin (2007) carries out a study measuring horizontal inequity in health care utilisation with the Canadian Community Health Survey of 2003. The study, titled "Equity in the Use of Health Services in Canada and Its Provinces," finds that the overall horizontal inequity in health care utilisation shows almost fair or pro-poor inequity in Canada, while dentist visits are more likely to be utilized by the higher income groups. This finding is consistent with that of van Doorslear & Masseria (2004). In addition, this study measures the HI*wv* indices by region within Canada and elucidates the existence of high disparities in health care utilisation by region. The small regions with low income disparities, such as Prince Edward Island (PEI), generally show fair or less pro-rich inequity in health care utilisation, while the regions which are lager have stronger pro-rich inequity. Therefore, it is more useful to use specified data than aggregate data in large countries, like Canada, for developing appropriate policies to alleviate disparities in horizontal inequity within a country.

An Australian study, titled "Health Policy and Horizontal Inequities of Health-Care

Utilisation in Australia: 1983-2005," is conducted by Hajizadeh, Connelly & Butler (2012) with the Australian National Health Survey (1983-2005). This study measures the HI*wvp* indices over the five time points for GP visits and they show strong pro-poor inequity across the five waves (-.0.429, -0.1829, na, -0.1494 & -0.2319), while the indices for specialist visits indicate pro-rich inequity (0.0596, 0.181, 0.1484, 0.1162 & 0.1157). The use of dental care shows more pro-rich inequity than that of specialist care (0.1390, 0.1995, 0.1105, 0.0935 & 0.2524) in Australia. In case of ambulatory visits, there is a pro-rich tendency before 2001 (0.0410, 0.0472 & 0.0251), but the tendency has been fluctuating since then-- somewhat pro-poor (-0.0229) in 2001 and somewhat pro-rich (0.0189) in 2005. The authors of the study analyze that the changes of the degrees of HI*wv* indices may be led by two important policy changes during that period of time: 1) the introduction of Medicare in 1983 in Australia increased health care utilisation by the poorer income groups and this served to increase the degrees of pro-poor inequity in general; and 2) the expansion of private health insurance between 1997 and 2001 possibly increases pro-rich inequity in certain types of health care services, such as specialist visits and dental care.

Prior to the above Australian study, van Doorslaer, Clarke, Savage & Hall (2008) attempt to observe the impact of the expansion of private health insurance on health care utilisation in their research paper, titled "Horizontal Inequities in Australia's Mixed Public/Private Health Care System." In this study, the authors conclude that the expansion of private health insurance as well as the increase of copayment for GP visits result in reduced overall pro-poor inequity in Australian health care system, although the method used has limitations to show clear causal relationship between them.

Over the past decades, studies of horizontal inequity in health care utilisation are carried out in many Asian countries, employing the same methods used among the European countries. In Japan, Ohkusa & Honda (2003) conducted a study, titled "Horizontal Inequity in Health Care Utilisation on Japan," using the Comprehensive Survey of Living Conditions in Japan (1992-1998) over three time points. This study measures the HI*wv* indices for aggregate physician visits and finds that there is almost fair or slightly pro-poor inequity (-0.0234, -0.0188 & -0.0039) in Japan. Although the authors conclude that overall health care utilisation in accordance with income levels in Japan is fairer compared to the previous study of the OECD countries done by van Doorslear, Koolman & Puffer (OECD, 2003), measuring horizontal inequity with an aggregate type of service utilisation is not

able to show the real distribution of health care with different levels of access to each health care service.

As an extension of the above study by Ohkusa & Honda (2003), the same authors conduct a study, titled "Updated Horizontal Inequity in Health Care Utilisation in Japan: Comparisons with OECD countries Using an Original Survey," with a survey data collected by the authors for using a harmonized data with the previous OECD study. Different from their earlier finding, the horizontal inequity of outpatient visits is almost fair (0.0002 or 0.0011)[10], which is the smaller degree of pro-poor inequity compared to the other OECD countries. In case of inpatient care, the degree of pro-poor inequity is the largest (-0.123), compared to the other OECD countries. The health care expenditure (OOP payment only) show somewhat pro-rich inequity (0.082). The Japanese studies reviewed in this section reveal that health care services in Japan are utilized relatively fairly across the income groups; however, there is lack of studies on horizontal inequity with specified utilisation types.

Recently, the government of China has expanded universal health care coverage not only to the people in the urban areas, but also in the rural areas. For that reason, researchers conduct studies measuring horizontal inequity in health care utilisation both in the urban and the rural areas; however, there is a paucity of studies written in English. Zhou, Gao, Fox, Rao, Xu, Xu & Zhang (2011) measure the HIwv indices with the National Health Service Survey of 2003 and 2008 for inpatient care utilisation in rural areas of China. The study shows that the inpatient care services are more likely to be used by the higher income groups in terms of admissions and stay days. The degree of pro-rich inequity to be admitted to hospitals in 2008 (0.1232) is reduced from the year of 2003 (0.2386) significantly, while the degree of pro-rich inequity in hospital stays increases in 2008 (0.1093) from the year 2003 (0.0841). The authors explain that the expansion of health care coverage and reduced income disparities in rural areas of China contribute to lowering the degree of pro-rich inequity in the use of hospital services. However, soaring health care prices still serves as a barrier for achieving horizontal equity in the rural areas of China.

Most recent study of horizontal equity in China is conducted by Zhao, Su, Gao, Campbell, Zhu & Xu (2013) using the four waves of the National Health Service Survey (1993, 1998, 2003 & 2008). The title of the study is "Assessing Equity of Healthcare Utilisation in Rural

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[10] The HIwv indices vary by the types of need variables included in the need-standardization process.

China: Results from Nationally Representative Surveys from 1993 to 2008," an extension of the study done by Zhou, Gao, Fox, Rao, Xu, Xu & Zhang (2011). This study measures the HIwv indices for outpatient and inpatient care services and the changes of horizontal inequity over the years. In case of outpatient care, the consistent tendency of pro-rich inequity has been changed to pro-poor inequity in 2008 (0.0486, 0.0310, 0.0167 & -0.0108), while the use of inpatient care services shows pro-rich inequity continuously (0.0529, 0.1543, 0.2325 & 0.1313). The authors explain that the main causes of the reduced degree of pro-rich inequity in the use of outpatient care are: 1) the expansion of health care coverage to the people in rural areas; and 2) the promotion for primary health care services in rural areas. On the other hand, the authors believe that the increasing income inequality in China as a result of rapid economic growth is highly associated in income-related inequity in health care utilisation in rural China.

3.5 Summary & Conclusions

The majority of studies on horizontal inequity in health care utilisation have conducted among European countries, where "equity" is considered as one of the most important performances of the area of health policy. Recently, however, other countries other than European countries began to measure horizontal inequity using similar methods.
The most important finding from the reviewed literature in this chapter is that there is income-related inequity in the use of health care services among the developed countries with comprehensive and universal health care systems. More specifically, GP visits and hospital (inpatient care) services are utilized almost fairly or favouring to the lower income groups, while specialist visits and dental care services show strong pro-rich inequity in the majority of the countries. This implies that the majority of health care systems' quality of care is rendered in accordance with ability to pay rather than health care need. The authors agree that the differences in the degrees of horizontal inequity across the countries mainly stem from system differences, such as the portion of out-of-pocket payments, the degree of the market share of private health insurance, physician payment system, and gatekeeping system.
On the other hand, developing countries without comprehensive universal health care systems are more likely to be dependent on the private sector and this may encourage

health care services to be utilized in accordance with income levels in relation to the high income inequalities as well as regional inequalities the societies bear.

The HI*wv* index, which is widely used for measuring horizontal inequity in health care utilisation, have an advantage that makes international comparisons easy as demonstrating distinctions between health care systems and their implications in relation to horizontal inequity in health care utilisation. However, the survey data used for calculating the indices are not optimal for making precise comparisons.

In addition, studies measuring horizontal inequity in health care utilisation within a single country are worthwhile to consider when developing proper policies, as comparing the degrees of horizontal inequity between the regions as well as observing the changes of inequity over time.

Although it is known that several socioeconomic factors, such as education, employment status, and wealth are associated with health care utilisation (Asada & Kephart, 2007; Bago, Lindeboom, O'Donnell, & van Doorslaer, 2011; Corrieri et al., 2010), empirical studies using the HI*wv* for measuring other socioeconomic inequity in health care utilisation than income are rare due to lack of proper type of ranking variables of socioeconomic -- wealth, education or employment-- status.

Part II   Equity in Health and Health Care in Korea

Chapter 4: Health Policy in Korea

4.1. Introduction

Traditionally, medical care services in Korea have been provided by the private sector. Korea experienced two historical events in the first half of the 20th century (Japanese colonization from 1910 to1945; and the Korean Civil War from 1950 to1953) that caused the Korean government to lose the initiative in making independent and planned health policies. In the 1970s, a military government seized political power by coup d'état and established a social health insurance program in 1977. There were several reasons for the military government to be enthusiastic about introducing a health insurance policy. It provided an opportunity to legitimate the government by building a welfare state, system competition between the governments of South and North Korea[11] and stable provision of industrial workers to the labour market for rapid economic growth (Kim, 2002). The majority of researchers claim that the stable provision of skilled industrial workers to the labour market was the most decisive reason for the establishment of the national health insurance program by the military government whose policy priority was economic development. However, it is believed that each of these motivations contributed to establishment and development of the National Health Insurance Program in its degree (Kim, 2002).

Because South Korea was at the very beginning stage of economic development then, the military government adopted a social insurance system that minimized the role of the government in health care financing. The government was operating a social health insurance policy with minimum financial subsidies with few regulations; therefore, the health care system was dominated by the private sector.[12] As a result, the health care system in Korea has developed within a highly market-oriented environment, characterized by competition and choice. Providers compete with each other by purchasing advanced medical technology and by developing various uncovered service[13] items to attract more fees from each patient. The universally covered health care system has been successful in that it

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[11] Based on its socialist's political ideology, the North Korean government began to provide social health insurance for the industrial workers in 1947 and the national health care service has been provided to the entire population for free as a universal program since the early 1970s.

[12] Currently, more than 90% of the hospitals and clinics are owned by private individuals or medical corporations in the forms of for-profit and not-for profit in Korea.

[13] Medical services which are approved their safety and efficacy by the Korean Food and Drug Administration (KFDA), but not covered by the National Health Insurance Program. In general, uncovered medical services are expensive new advanced health technologies and the fees are set up by individual service providers.

increased health care access, led to a rapid development of health technology, and improvement in health outcomes of the citizens. However, improperly regulated health care system has resulted in a distorted service delivery system and consequent high out-of-pocket (OOP) payments.

The later 1990s' saw intense neo-liberal restructuring, which occurred during the process of the financial bailout by the International Monetary Fund (IMF) in Korea. This has affected the socioeconomic structure of Korea in many aspects. Neo-liberalism values market-driven economies that espouse free trade, deregulation, privatization, minimal government and reduction of public spending. This neo-liberal restructuring pushed the Korean government to reform its labour laws to increase labour market flexibility and to privatize public-owned corporations to enhance efficiency through capital market free competition.

The labour market flexibility policy, as a result, led to massive layoffs and polarization between industries, followed by wider income gaps among socioeconomic groups. As [Table 4.1] shows, the Gini coefficient and the ratio of the 5th quintile to 1st quintile have kept increasing with minor stagnant or moderate changes for the last 15 years in Korea (Statistics Korea, 2012a). In accordance with the economic growth and the increased income disparity across the socioeconomic groups, unequal access to health care has arisen and relevant

[TABLE 4.1] INCOME INEQUALITY INDICES, 1996-2010

	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10
Gini Coefficient	0.266	0.264	0.293	0.298	0.279	0.290	0.293	0.292	0.301	0.306	0.330	0.340	0.344	0.345	0.341
Richest 5th/ Poorest 5th	4.01	3.97	4.78	4.93	4.4	4.66	4.77	5.0	5.27	5.53	6.65	7.09	7.38	7.70	7.74

Source: Statistics Korea, "Household Income and Expenditure Survey" (2012a)
*1996-2002: Urban households with 2 and more members
*2003-2005: Urban & rural households with 2 and more members
*2006-2010: Urban & Rural households including single person household

[TABLE 4.2] THE TREND OF WELFARE EXPENDITURE IN KOREA

(Unit: trillion KRW, %)

Classification	2002	2003	2004	2005	2006	Annual Growth Rate
Total Govt. Expenditure	131.1	157.0	168.7	183.4	194.1	10.3
Welfare Expenditure	26.1	31.7	41.4	48.9	54.2	20.1

Source: The National Financial Plan, 2007-2011, Ministry of Strategy and Finance (2007)

studies indicate the existence of inequality in health and health care among different income groups in Korea.

However, the government since the 1990s perceived the increased disparities within society as a serious social problem and began to allocate more resources to social and health welfare sectors for alleviating the problem [Table 4.2]. At the same time, the government tried to seek a new engine for economic growth for the next generation, substituting for the current manufacturing-based economy that has brought the country rapid economic growth in the late 20th century. In order to re-boost national economy for the new generation, the higher value-added tertiary industry (also known as the service sector)[14], which can attract foreign investment and induce potential economic growth of the country, has caught the attention of the Korean government. The recent Korean government, led by President Myung-bak Lee, regards health care as a tertiary industry that can contribute to national economic growth through open investment and unrestricted competition. In this context, Lee's administration prepared a health care reform proposal to promote domestic and overseas investment into hospitals (open investment hospitals) by deregulating the hospital ownership structure. Debates about the current reform proposal in Korea are ongoing. While physicians and hospital owners/investors welcome the new proposal in expectation of expanding their business areas, some citizens and academic professionals in Korea express deep concerns. One of the biggest federation of medical groups in Korea worries that the approval of open investment hospitals, which allows the distribution of the profits to their investors, may increase national health expenditure as well as OOP expenses, in order to maximize the investors' profits (KFHR, 2005). Within the government, the Ministry of Strategy and Finance and the Ministry of Health and Welfare indicate opposite stances, as well (Bae, 2009).

Different philosophical views on health care policy are expected to be debated for a long time. There were several reasons Lee's Administration sees health care as an important instrument for economic growth, and it believes that more private investment in health care, especially in hospitals, can create more national wealth. However, the wealth will not be created only by payments from rich patients. Regardless of their ability to pay, all patients will be required to pay for services, in part or full. The open investment policy will

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[14] Such as information technology (IT), finance, media contents, education, telecommunication, health care, etc.

essentially serve as a strong market mechanism. The risk is that it may lead to unequal use of health care among different socioeconomic groups by increasing OOP payment spends.

Although the Korean National Health Insurance (KNHI) Program has evolved with remarkable achievements during the last 30 years, socioeconomic equity in health has not been fully considered as a priority in policy decision making. In this sense, it is worth reviewing the recent health care reform proposal to analyse its impact on the health care system in Korea. In the next section, establishment of the KNHI Program, general features of the KNHI Program, major health care reforms, and recent health care reform proposal and related issues will be discussed.

4.2. The Korean National Health Insurance (KNHI) Program

4.2.1. Establishment

Social health insurance was first established in South Korea in 1977, to provide basic social welfare for industrial workers in order to expedite economic growth, which was the first priority of the national policy from the late 1960s. As of 1977, the social health insurance program only covered employees of large companies (500 or more employees), together with their family members. It later expanded to cover employees of smaller companies: more than 300 employees in 1979; more than 100 employees in 1981; and more than 16 employees in 1983. From the introduction of the employment-based program, membership of the insurance was family-based[15] and the contributions were shared equally by the employees and the employers based on their total earned incomes.

The effort to expand its coverage to the self-employed, including farmers, began with a pilot program in some urban and rural areas in 1981. After several expansions of the pilot program, the Korean society achieved the National Health Insurance (NHI) Program, which was mandatory universal coverage to the whole population in 1989, at the 12th year of its first implementation. The self-employed health insurance was organized based on the insured's residential regions and the contribution was imposed according to their income, assets and

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[15] Dependents of the employee insured should be: 1) spouses of the employee insured; 2) lineal ascendants, including lineal ascendants of their spouses; 3) lineal descendents, including lineal descendents of their spouses, and their spouses of the employee insured; and 4) brothers and sisters of the employee insured. The dependants of the employee insured should be supported mainly by the employee insured and not have other remunerations or income to be eligible.

family size. In the course of expanding the coverage to individuals who were self-employed, the government was forced to subsidize about half of the self-employed residents' contributions to balance the contribution burdens between the employed and the self-employed.

However, the two-tiered imposing method of contribution between the employed and the self-employed groups caused serious inequity issues[16] in health insurance financing. Before the merger of multiple insurers into a single insurer in 2000, there were three types of insurers that were comprised of more than 350 insurers in total. Each insurer was operated by a self-supporting accounting system with different scales of imposing contributions. Although the government was spending more than 40% of their total budget to subsidize the self-employed group, the deficits of the multiple insurers were chronic and the need for equalizing finance among the insurers was desperate. In order to resolve the problem, the National Health Insurance Corporation (NHIC), which is a single insurer, was established in 2000, for the purpose of enhancing financial efficiency and equity of the national health insurance program.

As of 2012, about 97% of the total population is covered by the KNHI program. Alongside with the mandatory KNHI program, low incomes are benefited by the government funded Medical Aid program[17] with an annual assessment of poverty status (about 3%). The Medical Aid program also provides the identical benefit package with the KNHI to the beneficiaries.

4.2.2 Political Background

The process of health policy formulation is essentially political because the impact of health policy is significant to the extensive stakeholders in this area (PAHO, 2007). Especially, policies on equity in health care are more likely to be influenced by each government's philosophical view. In the early years of the KNHI program, the government was only interested in providing basic welfare coverage to skilled industrial workers for the purpose of economic development. Later, increased demands for the better health care by the general public pushed the government to consider other important factors, such as quality and equity

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[16] This issue will be addressed in the next part.
[17] There are two types of Medical Aid beneficiary: 1) Type I (unable to be employed); and 2) Type II (working poor). The Type I beneficiaries receive inpatient care without co-payment and outpatient care with the fixed minimum co-payment. The Type II beneficiaries receive inpatient care with 10% of co-payment, and outpatient care with the fixed minimum co-payment (higher co-payment than the Type I beneficiaries).

in their health policy formulation. In particular, recent democratic progressive governments[18] attempted to expand benefit coverage and public hospital bed ratio as a means of reinforcing social safety nets for the less advantaged.

In this context, understanding political backgrounds of the National Health Insurance program in Korea is meaningful. Unlike other welfare states whose health security systems were established by struggles between industrial workers and their governments or as a means of national wealth (Jo, 2008), the KNHI program was established from the top down by the military government in the middle of the national economic development process and has evolved through a number of major and minor reforms in accordance with changed political environments by subsequent regimes.

4.2.2.1 The First Military Regime of the President Jung-Hee Park: 1961-1979

Implementing social health insurance in the 1970s was not an easy task for the people, as well as the government in Korea. It was about twenty-five years after the end of the Korean Civil War which took place five years after the liberation from the thirty-six years of Japanese colonial rule. Both historic events totally devastated the country during the first half of the 20th century. In 1961, the major-general Jung-Hee Park mounted a coup d'état under the typical pretext of ending the corrupt liberal regime that was led by the first President, Seung-Man Lee.

The military regime's first aim was to focus on economic development. At the time of the Coup, the GDP per Capita in 1960 was only $79 and this placed the country in one of the poorest countries in the world. [Table 4.3] clearly shows the state of Korean economy in the 1960s. In terms of health status, as [Figure 4.1] demonstrates, the average life expectancy and the infant mortality rate in the 1960s were 52.4 years and 93 per 1,000 live births, respectively. Compared to the averages of other OECD countries in the 1960s, the life expectancy was less than 15 years lower and the infant mortality was 3 times higher in Korea.

Under the impoverished socioeconomic circumstances, the military regime put all of its efforts to develop the economy. To legitimate his illegal seizure of power, President Park expressed his interests in welfare states on several official addresses[19] to the public. As a result, the authoritarian military government by President Park decided to establish a social

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[18] Led by the President Kim, Dae-jung (1998-2003) and the President Roh, Moo-Hyun (2003-2007).
[19] Official speeches made on 27 Dec. 1972, 12 Jan. 1977, 27 Dec. 1978, etc.

[TABLE 4.3] GDP PER CAPITA AND GROWTH RATE CHANGE, 1975-2009

(Unit: US$, %)

	1960*	1965*	1970*	1975	1980	1985	1990	1995	2000	2005	2009
GDP per Capita (growth %)	79 (1.2)	105 (5.7)	248 (8.8)	608 (5.9)	1,673 (-1.5)	2,366 (6.8)	6,151 (9.2)	11,471 (9.2)	11,350 (8.5)	17,548 (4.0)	27,100 (6.8)
GDP per Capita, OECD Ave. (growth %)	-	-	3,412 (3.7)**	7,516 (0.4)	8,533 (1.3)	12,092 (3.8)	16,254 (3.1)	19,481 (2.5)	24,360 (4.2)	29,568 (2.7)	33,080 (-3.4)

Source: Bank of Korea, National Income Statistics (2012); OECD Health Data (2011)
**Bank of Korea, using GDP per Capita
** Data in 1971

health insurance system to gain people's favour and solidify the unity of the country. Government-driven policy formulation and implementation was directed solely by the Economic Development Plan[20] during the regime.

While the export-driven economy was growing rapidly, there was a considerable lack of health care infrastructure in the 1970s, in terms of hospital facilities and health professionals. In fact, most western and traditional types of hospitals have been owned by private individuals in Korea. For a successful policy implementation, the government felt that they

[FIGURE 4.1] LIFE EXPECTANCY AND INFANT MORTALITY RATE CHANGES IN KOREA
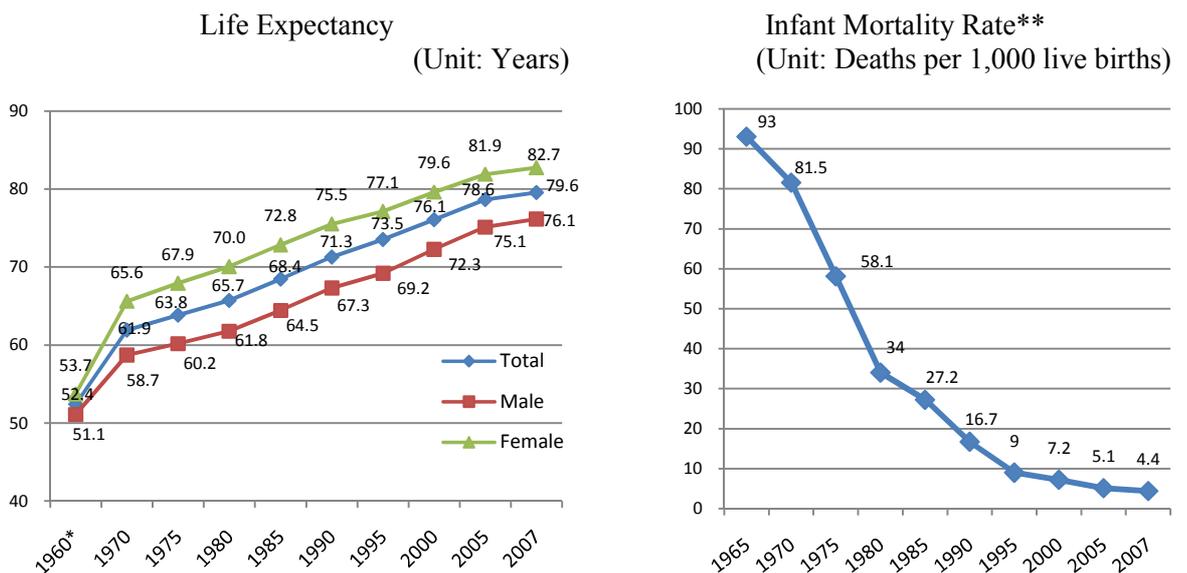
Source: Statistics Korea, Life Table (2011), 2011 Demographic Yearbook (UNSD, 2012)
*Average years of the 1960's
**Average rates of every five years

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[20] The plans were designed to increase wealth within South Korea and strengthen political stability. A change in policy from import substitution industrialization to export-oriented growth occurred throughout these five year plans. South Korea had three five year plans under the auspices of the Economic Planning Board, a state bureaucracy pilot agency from 1962 to 1997 (1st – 7th).

had to mandate the privately owned hospitals to provide essential medical care to the insured with government-fixed low fees. There were some resistance from the medical societies to the new policy, but it was insignificant because the program only applied to a small part of the population at that time, 8.78% of the total population (Chun, Kim, Lee, & Lee, 2009).

4.2.2.2 The Consecutive Military Regime: early 1980s- mid 1990s

After President Park, two military governments led by President Doo-Hwan Chun (1981-1988) and President Tae-Woo Roh (1988-1993) succeeded the presidency consecutively and their political will to expand the health insurance coverage, in terms of population, was strong with the same purpose of the previous government. As President Roh pledged at the presidential election campaign in 1987, the National Health Insurance (NHI) program was achieved in 1989, covering around 90% of the total population with a uniform benefit package to the insured [Table 4.4].

In achieving universal health care, the governments maintained the 'low contribution- low benefit' structure which was built from the introduction of the program. Unlike the earlier stage of the program, the medical societies began to express hidden frustration about the government-controlled service fee setting system. Before universal coverage, providers could charge different-- mostly more expensive-- service fees to the uninsured to make up their income deficits. Under the universal health care system, the financial incentive from the two-tier price system was no longer available to the providers; meanwhile they began to increase service volumes to create more incomes under the fee-for-service (FFS) payment system. However, the authoritarian power overwhelmed the appeal against the low fees by the providers until the end of military regimes.

[TABLE 4.4] EXPANSION HISTORY OF THE KNHI PROGRAM (1980-2010)

	1977	1979	1981	1982	1984	1988	1989	1995	2010
Population Covered	3,200,269	7,957,460	11,497,415	13,803,779	17,165,277	28,906,359	39,922,389	44,015,900	48,906,795
Coverage (%)	8.79	21.20	29.69	35.10	42.37	68.87	90.39	97.6	96.6

Source: Health Systems in Transition; Republic of Korea (2009)
NHIC English Brochure (2011)

4.2.2.3 Democratization of the Korean Society: from the mid 1990s

During the era of President Dae-Jung Kim (1998~2003), things changed radically. President Kim[21] cherished a 'democratic process' of policy formulation and encouraged relevant stakeholders to participate in the policy process. Civic groups were especially empowered to speak for the rights on behalf of the general public. At the same time, medical professionals gained political influence to offer their specialized knowledge and information in developing health care policies. President Kim's administration implemented three major health care reforms. They decided on a single insurer system (finance, 2000), separated drug prescribing and dispensing (pharmaceuticals, 2000), and introduced the DRGs system (Payment, 2002) (Kwon & Reich, 2005). The implementation of President Kim's policies clearly showed changed health care governance in Korea -- more policy inputs from various stakeholders and improved transparency in the process of policy making.

4.2.2.4 Summary

Political commitment by previous governments played a decisive role in establishing and expanding the NHI program in Korea. The former military regimes achieved universal coverage by mandating social health insurance membership and automatic participation of medical care institutions. As a result, health outcomes improved in accordance with the economic growth and social solidarity was also achieved based on the uniform benefit package to the insured. The wave of democratization since the late 1990s has improved the policy formulation process by encouraging more involvement from various stakeholders. Although there are many things that should be considered to achieve a better health care system in the future, the previous governments played important roles as a major agent of developing and implementing health policy in Korea.

4.3 General Features of the KNHI Program

4.3.1 National Goals of Health Policy

The White Paper of Health, Welfare and Family Affairs (2010) is a comprehensive national annual health report published by the Ministry of Health and Welfare. The report states that

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[21] President Dae-Jung Kim was awarded the Nobel Peace Prize in recognition of his lifetime contribution to political democratization of the society and building peaceful relationship between South and North Korea through the "Sunshine Policy" during his regime.

the goal of national health policy is to provide high quality health care to the people through: 1) strengthening the safety management system of food, drugs and blood; 2) ensuring an effective public health care system; 3) rendering customer (patient)-oriented medical service; and 4) rationing health care resources.

The "Health Plan 2010[22]" is one of the recent national projects implemented by the Ministry of Health and Welfare to improve citizen's health status through health education, disease prevention, nutrition improvement and health behaviour change. The plan articulates that the goals of health promotion are: 1) to extend health-adjusted life expectancy (HALE); and 2) to enhance equity in health. Before the year 2010, the goals of the project (2002, 2005 and 2008) were focusing on improving health through diverse strategies, and equity in health was placed at the least priority of the strategies. Although specific plans have not been fully implanted yet, the equity placed in higher priority of the national health policy goal for the first time.

According to the National Health Insurance Act of 2008 (final amendment), the purpose of the KNHI program is "to improve citizen's health and promote social security by providing citizens with insurance benefits for, prevention of disease and injury, medical examination, medical treatment, rehabilitation and childbirth, and improvement of health."

The primary goals of Korean health policy have been to improve health outcome by expanding benefit coverage, controlling quality of care and enhancing management efficiency. But there have been few studies or policy proposals on how to achieve those goals in an equitable manner across the different socioeconomic groups of the society. Recent government reports have begun to set equity in health as one of the priorities in the national health policy. However, sophisticated policy development and implementation is still needed for a successful achievement of the goal of equity in health and health care.

4.3.2 National Health Expenditure

The Korean government is struggling with the soaring national health expenditure, similar to other countries, due to things such as an aging society, increasing chronic diseases, rapid introduction of new health technologies and drugs, fee-for-service payment system, etc. Different from other high income countries; however, the role of the government in health

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[22] Based on the National Health Promotion Act (2008), "the Minister for Health and Welfare shall develop a master plan for the national health every five years after going through the deliberation thereof by the National Health Promotion Policy Deliberative Committee."

care financing has been marginal in Korea. According to the OECD Health Data 2011, Korea spent 6.3% of the total GDP on health in 2009 and this places the country into the lowest group within the OECD countries. The ratio of public funding is as low as 54.9% -- the average ratio of OECD countries is 72.8% -- and the ratio of out-of-pocket (OOP) payment is the second highest (35.7%), just below that of Mexico [Table 4.5] [Figure 4.2].

The total health expenditure per capita is rapidly increasing from $809 in 2000 to $2,197 in 2011. During the last decade, the health expenditure per capita has doubled, though the absolute amount is lower than the OECD average (US$2,984, PPP) [Table 4.6 &.7].

[TABLE 4.5] HEALTH CARE EXPENDITURE RATIO IN KOREA, 1990-2011

(Unit: %)

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011
Health Expenditure Ratio to GDP	4.3	4.1	4.7	5.7	6.1	6.4	6.6	7.1	7.3	7.4
Public Funding Ratio	36.5	36.3	44.9	52.1	54.8	55.1	54.8	56.7	56.5	55.3
Private Funding Ratio	63.5	63.7	55.1	47.9	45.2	44.9	45.2	43.3	43.5	44.7

Source: Ministry of Health and Welfare (2013)

[TABLE 4.6] OUT-OF-POCKET EXPENDITURE IN KOREA, 2000-2011

(Unit: US$, PPP, %)

	2000	2005	2006	2007	2008	2009	2010	2011
total expenditure on health per capita	809	1,296	1,491	1,688	1,758	1,895	2,083	2,199
OOP expenditure on health (Ratio to total expenditure, %)	371 (45.9)	506 (39)	548 (36.8)	603 (35.7)	624 (35.5)	648 (34.2)	712 (34.2)	774 (35.2)

Source: Ministry of Health and Welfare (2013)

[FIGURE 4.2] OOP PAYMENT RATIO OF OECD COUNTRIES, 2009
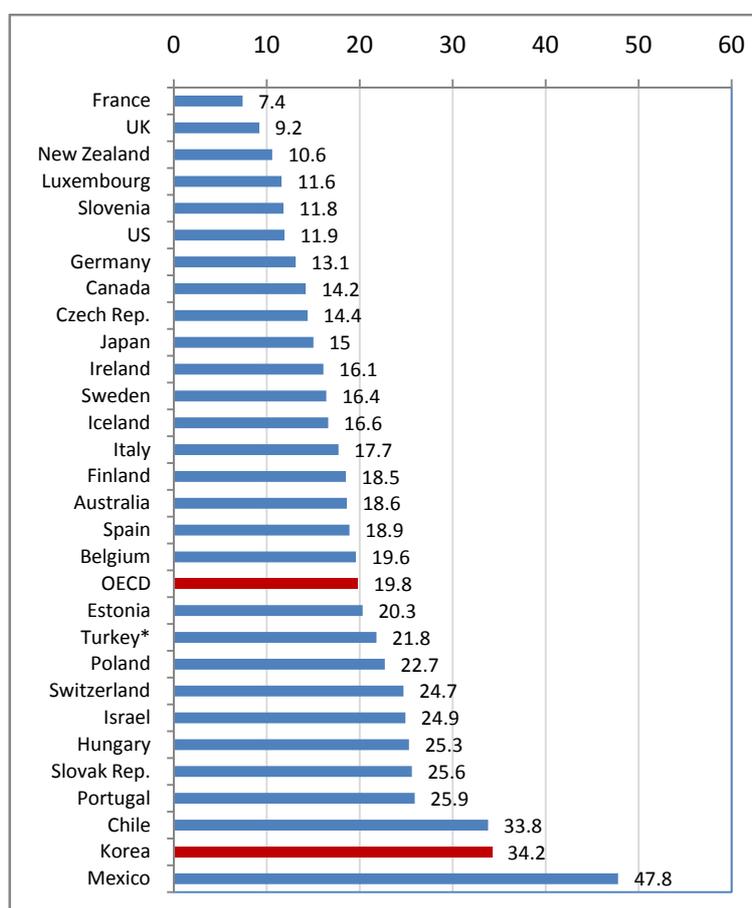
Source: OECD Health Data (2011)

[TABLE 4.7] OUT-OF-POCKET (OOP) EXPENDITURE AMONG SELECTED OECD COUNTRIES IN 2009

(Unit: US$, PPP)

	Korea	France	Germany	Japan	Sweden	Switzerland	UK	US
total expenditure on health per capita	1,879	3,962	4,187	3,025	3,703	5,299	3,422	8,247
OOP expenditure on health (% of total health expenditure)	648 (34.2%)	294 (7.4%)	548 (13.1%)	453 (15.0%)	607 (16.4%)	1,272 (24.7%)	319 (9.2%)	956 (11.7%)

Source: OECD Health Data (2011)

4.3.3　Structure of the KNHI Program

4.3.3.1　Management

The principle agents of the management of the KNHI Program are the Ministry of Health and Welfare ("the Ministry" hereinafter), the National Health Insurance Service (NHIS) and

the Health Insurance Review & Assessment Service (HIRA). The Ministry oversees the program as a whole. The NHIC is a public single insurer and responsible for administering the program as managing eligibility, collecting contributions, setting fees schedule through negotiation with service providers and reimbursing rendered medical services based on the review results of medical fees provided by the HIRA. The HIRA is an independent public agency conducting reviews of medical fee claims and assessment of medical service quality provided by medical institutions [Figure 4.3].

After receiving medical or pharmaceutical services, patients pay official co-payments (fixed prices or fixed rates) to service providers. And the service providers submit medical claims to the HIRA, then the HIRA reviews the claims in accordance with the review guidelines and notify the review results to the medical institutions and the NHIC for reimbursement. The insured pay their insurance contributions to the NHIC on a monthly basis.

[FIGURE 4.3] DIAGRAM OF THE KNHI MANAGEMENT
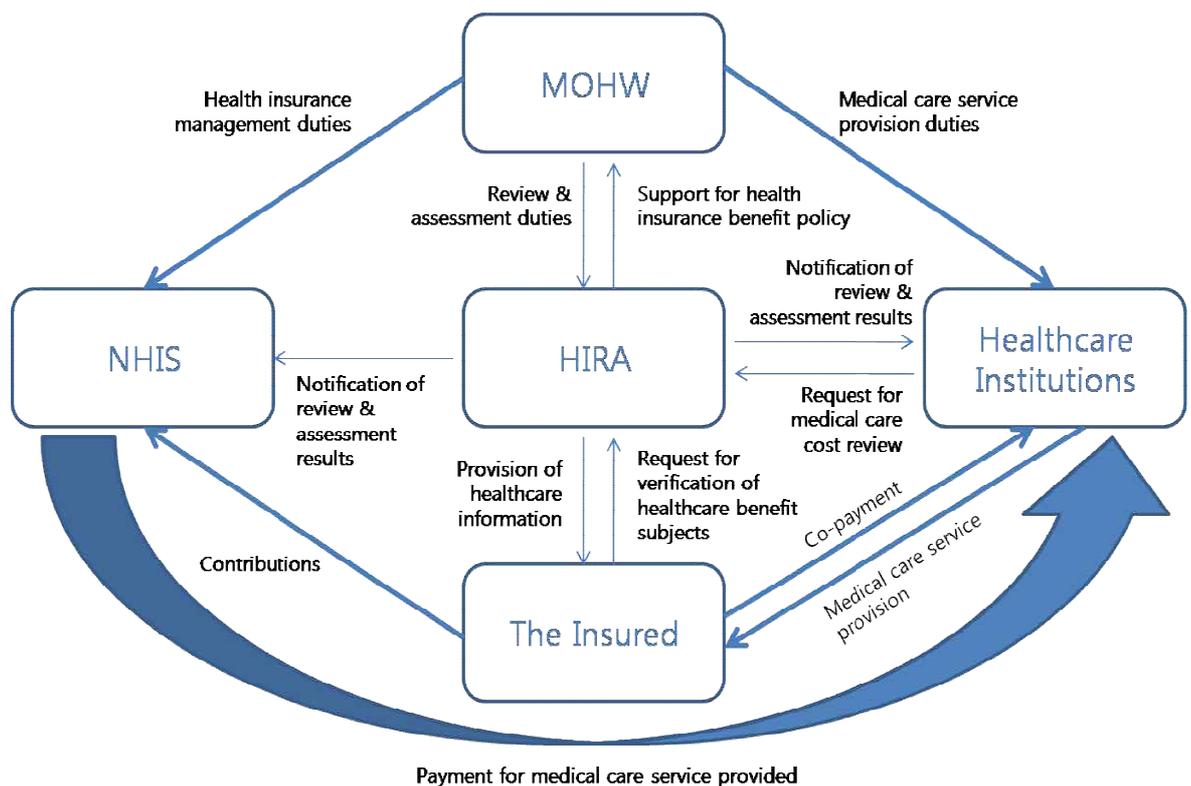
Source: HIRA, Health Insurance Review & Assessment Service, English Brochure, 2011 (2012)
Note: The Insurer (NHIC) has changed its name to NHIS (National Health Insurance Service) in 2013

4.3.3.2 Finance

The revenue of the KNHI program consists of the insured's contributions (80%), general taxes (14%) and health promotion funds (6%). The contributions from the insured are collected by a two-tier system: 1) employment-based; and 2) self-employed. As of 2012, the employment-based insured pay 5.8% of their total incomes, and the employers and the employees share the contribution equally (2.9%, each). The contributions of the self-employed are calculated based on their income, assets and family size [Table 4.8]. To equalize the burdens between the employment-based and the self-employed, the government subsidizes about 50 percent of the contributions of the self-employed.

In 2012, the management cost of the total KNHI program accounted for 3% and 97% of the total expenditure was spent for medical care benefits to the insured (NHIC, 2012). The portion of management cost is relatively very low in Korea, compared to other countries employing social health insurance, such as Germany (5.7%) and France (7.9%)[23].

[TABLE 4.8] REVENUE OF THE KNHI PROGRAM (AS OF 2012)

Classification		Employment-based	Self-employed
Revenue	Contributions	- 80% of the expected revenue for the fiscal year · 5.8% of average monthly wage · evenly shared by the employers and the employees · pay as you earn	· multiply unit price to the points earned based on income and assets · monthly billing, individual payment
	Gov't subsidies	- 14% of the expected revenue for the fiscal year	
	Health Promotion Fund	- 6% of the expected revenue for the fiscal year	

Source: Ministry of Health and Welfare, Website, accessed in July 20, 2012

4.3.3.3 Benefits

The benefit coverage of the KNHI Program is about 55% of the total health expenditure. The criteria of insurance covered benefits, which are stipulated by the National Health Insurance Act, are prevention and treatment of diseases and injuries resulting from daily life, childbirth, health promotion and rehabilitation. The vast majority of the benefits are granted in-kind[24].

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[23] The management cost rate of the United States, whose health care system is private insurance dominant, is 14.1%.
[24] In-kind benefits: treatment for diseases, injuries and childbirth
Cash benefits: refunding allowance for health care and appliance expenses for the disabled

[TABLE 4.9] CO-PAYMENT DETAILS

Type of Service	Details
Inpatient care	5-20% (cancer or catastrophic disease: 5-10%)
Tertiary Hospitals	100% of consultation fee + 60% of treatment cost
General Hospitals	50% of total cost
Hospitals	40% of total cost
Clinics	30% of treatment cost * aged 65+ - under $15: $1.5 - over $15: 30% of total cost
Pharmacies	30% of total cost * aged 65+ - under $10: $1 - over $10: 30% of total cost

Source: Ministry of Health and Welfare, Website, accessed in July 20, 2012
National Health Insurance Corporation, Brochure (2012)

The insured should share part of the medical costs incurred, so called 'co-payment,' to avoid patient-induced excessive utilisation of medical services. Patients share 10-20% of the total inpatient costs (consultation fees and treatment costs), and 30-60% of the total outpatient costs, depending on types of medical institutions. The detail of the legal co-payment rates of outpatient care is illustrated in the [Table 4.9].

To prevent low-incomes from catastrophic health care costs, the government applies a co-payment ceiling system when the annual health care expenditure exceeds $1,800-$3,600, depending on the individual's income level. However, the co-payment ceiling system is not applied to the costs incurred by uncovered medical services.

4.3.3.4 Delivery System

As of 2008, 58,237 medical care institutions out of the total 61,869 medical institutions are private (94.1%, excluding pharmacies) in Korea. Among the private institutions, 56,072 institutions (90.6% of the total institutions) are private for-profit hospitals and clinics [Appendix 3][25]. Compared to other OECD health care systems, it is unusual that the private sector providers play such a major role in delivering public health care in Korea. There are

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[25] Big hospitals whose tax benefits are larger than their after tax business profits, convert their 'private for-profit' ownership status into medical corporations which are still 'private, but not-for-profit.'

[FIGURE 4.4] HIGH TECHNOLOGY MEDICAL EQUIPMENTS PER MILLION POPULATIONS AMONG SELECTED OECD COUNTRIES, 2009

MRI

Country	Value
Japan	40.1
USA	25.9
Iceland	19.3
Italy	18.6
Austria	17.7
Korea	16
Finland	15.3
Switzerl...	14.4
Greece	13.2
OECD	11
Luxemb...	10.5
Denmark	10.2
Spain	9.3
Portugal	8.9
New...	8.8
Ireland	8.5
Germany	8.2
UK	8.2
Belgium	7.5
Canada	6.7
Netherl...	6.6
France	5.7
Slovak	5.7
Turkey	5.6
Austrailia	5.1
Czech	4.4
Hungary	2.8
Poland	2.7
Mexico	1.5

CT

Country	Value
Australia	56
Belgium	41.6
Korea	37.1
USA	34.3
Iceland	32.1
Italy	30.3
Austria	29.8
Luxembou...	27.3
Portugal	26
Greece	25.8
OECD	20.2
Switzerland	18.7
Denmark	17.4
Finland	16.4
Germany	16.3
Spain	14.6
Ireland	14.3
Slovak	13.7
Czech	12.9
Canada	12.7
New...	12.3
France	10.3
Poland	9.7
Netherlands	8.4
Turkey	8.1
UK	7.6
Hungary	7.3
Mexico	4

Source: OECD Health (2009)

[TABLE 4.10] NUMBER OF MEDICAL INSTITUTES (INC. PHARMACIES) & PFOFESSIONALS BY REGION, 2011

Region		Number of Medical Institutions	Number of tertiary and general hospitals		Number of Medical Professionals
			Tertiary	General	
Urban Areas	Seoul	20,938	17	40	74,112
	Kyung-Gi	16,700	5	48	50,616
	Busan	6,048	4	23	22,143
	Daegu	4,463	4	8	15,173
	Incheon	3,757	2	13	11,507
	Kwangju	2,489	2	19	10,588
	Daejeon	2,662	2	6	9,464
	Ulsan	1,627	-	4	5,216
	sub-total	*58,684*	*36*	*161*	*198,819*
Rural Areas	Kangwon	2,257	2	13	8,251
	N. ChoongChung	2,434	1	10	6,766
	S. ChoongChung	3,338	2	10	8,812
	N. JeonRa	3,421	2	12	10,662
	S. JeonRa	3,148	-	22	10,732
	N. KyungSang	4,076	-	18	12,389
	S. KyungSang	4,695	1	23	15,460
	JeJu	895	-	6	3,303
	sub-total	*24,264*	*8*	*114*	*76,375*
Total		**82,948**	**44**	**275**	**275,194**

Source: 2011 National Health Insurance Statistical Yearbook (2012)

four levels of medical institutions in Korea-- 1) tertiary hospital[26]; 2) general hospitals[27]; 3) hospitals[28]; and 4) clinics and health centre. Because there is no official gatekeeping system in accessing medical care institutions, patients have freedom to choose any level of institutions, paying different rates of co-payment. Hospitals, which are mostly private for-profit, compete with each other to attract more patients by having expensive advanced health technologies [Figure 4.4].

The distribution of medical care institutions and health professionals is concentrated in urban areas. About half of the total population lives in the Capital City, Seoul, and its outskirts, Kyung-Gi Province and more than 70% of all institutions are located in this big urban area. Specifically, most tertiary hospitals and general hospitals are concentrated in the metropolitan cities including Seoul and Busan, as [Table 4.10] illustrates.

4.3.3.5 Provider Payment System

The fee-for-service (FFS) is the major payment system in the KNHI Program. While the FFS system may have more possibility to provide quality medical services, there is a high risk of overuse medical services that are not necessary for. In order to optimize the service volume, the Diagnosis Related Groups (DRGs) system has been partly introduced in 2002 for certain illnesses. Although the new system shows a considerable reduction of service volume, it is currently being operated on a voluntary basis for tertiary and general hospitals because there is a strong resistance from the medical service providers (HIRA, 2011, 2013; Kang et al., 2009a; Lee, 2005a).

The physicians' fee schedule is determined by multiplying each treatment's resource-based relative value (RBRV) score to the unit price (conversion factor) which is the amount agreed upon between the Head of the NHIS (the single insurer) and the representatives of the providers. The physician fees have been set very low under the FFS system, compared to other countries with similar GDPs.

As part of quality assessment program[29], a quality incentive program called pay-for-performance (P4P) has been implemented since 2007. This ensures that quality medical services are provided while reflecting the quality assessment results to the reimbursement

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[26] The Minister of Health and Welfare may designate a general hospital specialized in providing high level of expertise for treating serious diseases as a tertiary hospital.

[27] General hospitals equipped more than 100 patient beds with 7 or more specialized departments. If a general hospital has more than 300 patient beds, it should provide 9 or more specialized departments.

[28] Hospitals shall be furnished with not less than 30 patient beds.

[29] The assessment categories are Acute Myocardial Infarction (AMI) and Caesarean Section Delivery.

amount. This program only applies to the 43 tertiary hospitals as a pilot program, and 1% of the total reimbursed amount by the insurer is granted to the providers as incentives/ disincentives, depending on the grade level they earned[30].

4.3.4. Issues

Thanks to the achievement of universal coverage in a short time, citizens of Korea have been able to access health care more easily than ever before and, as a consequence, their health status have been much improved. To expand the initial social health insurance that only applied to a limited population to universal coverage, the government designed a program based on the 'low contribution-low benefit coverage' frame to minimize financial burdens for employers, the insured and the government.

The FFS payment system was an ideal mechanism to encourage the service providers to participate in the early stage of the program because the number of the insured was very limited within the initial limited health insurance funds. As the policy got expanded to the larger population, the FFS payment system caused an unexpected rapid increase in the national health care cost. There was provider-induced service volume to compensate the low physician fees. In addition, a variety of unregulated uncovered services that were expensive has also contributed to the increase in the total health care expenditure.

Another limitation of KNHI is the low benefit coverage. This limited coverage leads to patients, especially those with serious illness, struggle with high OOP payments. Many of very new and innovative health technologies for treating serious illness, like cancers, are provided by uncovered services. The high OOP payment may act as a serious barrier for the disadvantaged patients.

The high possibility for an inefficient health care resource allocation is another issue in the KNHI program. As discussed above, there is no official gatekeeping system in Korea so that patients are able to access any level of medical institutions without professional clinical judgement by general practitioners. In Korea, it is common for patients with minor cold symptoms to visit the highest level of hospitals (i.e. tertiary hospitals) without any screening system before their first visit to the hospitals and this causes a great deal of unnecessary burden to the KNHI finance.

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[30] The P4P program has been implemented as a regular program since 2011.

The problems described above can be categorized into the three key values every society'
health care system pursues; *efficiency, quality and equity*. Not rationed health care resources,
such as providing unnecessary high technologies as a form of uncovered services without
proper national guidelines, no gatekeeping systems to access tertiary hospitals or general
hospitals with minor symptoms, hinder efficient management of the KNHI program. The
FFS payment system makes it difficult to avoid unnecessary medical services that may be
provider-induced to maximize their income. At the same time, the overuse or misuse of
medical services also threaten the quality of care for patients. Especially, the current KNHI
Program may cause serious equity problems due to high OOP payments based on the FFS
system along with limited benefits on essential medical care. More affordable patients are
able to assess better services at the higher level of medical institutions, while the
disadvantaged may not be able to do the same.

For this reason, there have been consistent demands for health care reform to straighten those
problems and make the program more efficient, qualitative and equitable.

4.4 Previous Major Reforms of the KNHI Program

Health care reforms have been continuously implemented since its first introduction in Korea;
however, major health care reforms were carried out during the last decade as below [Table
4.11]:

[TABLE 4.11] SUMMARY OF THE MAJOR HEHALTH CARE REFORM IN KOREA

Year	Area	Brief Description
1999	Finance	- merger among multiple insurer into a singly insurer
2000 & 2006	Pharmaceuticals	- separation of prescribing and dispensing practice in 2000; - the introduction of the positive list system in 2006
2002 & 2012	Provider Payment	- introduction of a DRGs system in 2002 on a voluntary basis; - expansion to all clinics and small/medium sized hospitals on a compulsory basis in 2012
2005	Benefit Expansion	- see [Table 8.1]
2008	Long-term Care	- implementation of Long-term Care Insurance under the KNH program in 2008

4.4.1 Finance

Before the merger among multiple insurers, there were 374 medical societies (insurers) in Korea. As stated earlier, medical societies for the self-employed encountered chronic financial difficulties due to the different methods of setting the contribution rate across the medical societies. While contributions of employees were collected based on their incomes only, contributions of the self-employed were determined by their income, assets and family size. To provide a statutory uniform benefit package to the entire population, it was thought that those who were self-employed should pay more to make up for the lack of employers' subsidies. Therefore, the Kim Administration decided to play a more active role in financing as subsidizing about the half of the contributions of the self-employed. This was a big progress compared to the previous governments who wanted to minimize their roles in financing.

After the merger into a single payer, more equality has been achieved in financing the self-employed group by pooling the risks across the insurers. Still, there exists inequality in financing between the employed and the self-employed because of the different sources of subsidies. The external appearance is a merged single insurer, but it has a two-tier internal accounting system: 1) employer subsidized account (the employment-based) and; 2) government subsidized account (the self-employed). Although the self-employed pay more contributions due to the lack of government subsidies[31], the revenue from the employed should cover the deficit of the self-employed for providing a uniform benefit package to all. There have been some improvement in financing within groups after the merger, however, the further health care reform should address inequalities between the employed and the self-employed groups in financing.

4.4.2 Pharmaceuticals

Both doctors and pharmacists were able to prescribe and dispense drugs in Korea before the implementation of separation of prescribing and dispensing policy in 2000. The previous combined system worked as a financial incentive for both professionals to dispense more drugs and to select drugs with more profit margins. Therefore, this system unintentionally encouraged overuse of drugs and contributed to the dramatic increase of drugs expenditure in Korea for a long time.

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[31] The government often does not allocate the subsidies fully.

Dispensing drugs was an important source of income for doctors and prescribing drugs was also an important professional symbol for pharmacists. Therefore, the new policy faced very strong resistance from both parties. However, the empowered civic groups as well as Kim administration's commitment to contain the spending for drug expenditure played critical roles for change the system. Although this policy was introduced to contain the pharmaceutical costs and straighten the prescription behaviour of medical professionals, pharmaceutical expenditure still has been one of the main reasons for the increase of national health expenditure, accounting for about 30% of the total health expenditure. There are several reasons that the policy has not been working as it was originally designed: 1) unlike physician fees, drug prices are set based on the average prices of the international market; and 2) physicians and patients in Korea prefer medication therapy with brand drugs (Ministry of Health and Welfare, 2006).

In 2006, therefore, the positive listing system has been introduced to contain soaring costs of drugs through selectively listing cost-effectiveness drugs based on their economic evaluation results. After conducting a pilot program, the system will be fully implemented to the KNHI program.

4.4.3 Provider Payment

The Diagnosis Related Groups (DRGs) system was introduced as a pilot program in 1997. According to the relevant studies (HIRA, 2011; Kang et al., 2009a; Lee, 2005), introduction of DRGs had positive effects on the reduction of service volumes while maintaining quality services.

As of August 2009, 70% of the medical institutions that were targeted for the DRGs payment program participated, but no tertiary hospitals[32] were included [Appendix 4]. While the total participation ratio has been continuously increasing, the participation of large hospitals (tertiary and general hospitals) has been decreasing due to the inability of the DRG prices to reflect the rapid changes of new health technologies. The result also indicates that the voluntary-based program has not been powerful enough to encourage the target hospitals to take part in the government-driven program for the service volume rationalization.

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[32] In order to make the DRGs system more successful, the participation of tertiary hospitals which provide more expensive medical services is necessary.

4.4.4 Benefit Coverage Expansion

As the national economy grows, the demands for better health care have been raised from various social groups. As a result, it was not avoidable to put the discussion of the insurance benefit expansion on the table within the Ministry. The expansion is accompanied by the raise of contributions paid by the insured, so that the government struggled to find an optimal point meeting the scope of benefit expansion and the size of contribution increase. Hence the Ministry of Health and Welfare published the 'National Health Insurance Benefit Coverage Expansion Plan' in late 2005 (21 December 2005, Ministry of Health & Welfare, 2005). The Plan especially focused on the coverage expansion for cancer and fatal disease treatments, including procedures, tests and drugs. Because of the benefit expansion plan, cancer patients began to pay 10% of the total medical care cost for insurance covered cancer treatment, instead of the previous 20%.[33] As a result, the insurance benefit coverage rate[34] for cancer treatment was raised to 71.5% in 2007 from 49.6% in 2004. On top of the cancer treatment coverage expansion, the insurance coverage has been gradually expanded to inpatient meals,[35] higher level of hospital wards,[36] hospitalization charges under 6,[37] adjustment of the co-payment ceiling system based on the income level among low income groups, some essential high technologies, basic dental care (e.g. false teeth for the elderly and tooth scaling), oriental physical therapy and so on[38]. In order to meet the target benefit coverage rate which was 70% by 2008, the government would increase contributions by 4.1% (annual average). However, the coverage rate of the KNHI is 62.2%[39] (NHIC, 2008), due to the soaring increase of uncovered services.

4.4.5 Long-term Care Insurance

Korea is one of the fastest ageing societies in the world. According to the Ministry of Health and Welfare, Korea entered the ageing society in 2000 (7% of aged 65 and over), will be an

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[33] As of 2010, the co-payment rate for cancer treatment is lowered by 5%.

[34] Benefit coverage rate: covered service expenditure/(covered service expenditure + co-payment amount + uncovered services expenditure) x 100

[35] In 2006, the insurance began to cover inpatient meals with 20% of the patient co-payment, but the co-payment rate was adjusted to 50% in 2008. Before the expansion plan, inpatient meals were not covered by the insurance.

[36] Before the expansion plan, the insurance only covered the hospitalization charges of hospital wards for 6 beds (standard wards). However, due to the limited availability of the standard wards (50%), the insurance has expanded its coverage to the upper level hospital wards since 2007.

[37] In the beginning of the expansion plan, the insurance provided 100% fee waivers for hospitalization under 6, however, the patients under 6 have paid 10% of total hospitalization fees since 2007.

[38] For more information, see Chapter 8, [Table 8.1].

[39] The benefit coverage rate calculated by the NHIC (64%) is different from public financing ratio (54.9%) of the System of Health Account (SHA, OECD method) .

aged society in 2018 (14% of aged 65 and over) and a super-aged society in 2026 (20% of aged 65 and over). On the other hand, the fertility rate has reduced continuously from 2.42% in 1982 to 1.19% in 2008. This demographic change necessitates a specialized care system for the increasing elderly population in health. As part of the KNHI program, the long-term care insurance (LTCI) program first implemented in 2008, after the three years of the pilot program since 2005. The LTCI is financed as imposing additional 4.78% of the KNHI premium. The total revenue of the program consists of the contribution (60%), the government subsidies (20%) and patients' co-payments (20%). The co-payment rates of the LCTI program are 15% for in-home services and 20% of long-term facility services.

It is too early to evaluate the LTCI program comprehensive yet; however, considerable surveys show positive responses to the new insurance (Ministry of Health and Welfare, 2008), and this also contribute to rationalize unnecessary expenditures caused by the elderly patients who stayed at acute care facilities for a long time with less curative diseases.

4.5 Recent Health Care Reform Discussion

During his presidential election campaign, President Myung-Bak Lee pledged an economic growth, introducing the '7-4-7 project' (annual economic growth by 7%, more than $40,000 GDP per Capita, and the world's 7th largest economy). Although Korea was recently ranked the 15th largest in the world economy, economic growth is still the top national policy priority. Specifically, President Lee's policy direction is deeply influenced by neo-liberalism which emphasizes the importance of free market, deregulation and ownership, and minimizing government intervention to the market. In this context, the Lee Administration is carrying forward privatization of public corporations in many sectors, including finance, social infrastructure (highway, railway, urban development, electricity, etc.), and health care, as well.

A health care reform proposal has been presented by the Ministry of Strategy and Finance since 2004 of the former President Roh's Administration (KHIDI & KDI, 2009). Its main focus is 'deregulation' of hospital ownership to promote active investment from various sources. The proposal carries an important meaning because it opens an official discussion for a transition to market-oriented health care service provision, although the health care

system in Korea has considerable market-oriented characteristics already due to its private-dominant service provision.

4.5.1 Hospital Ownerships in Korea

The achievement of universal health care in 1989 was a critical turning point in the structural change of the hospital industry in Korea. Universal health care enabled patients to access better health care with affordable costs. For the providers, it was an opportunity to expand the health care market because it included the entire population in Korea. This expanded health care market served as a strong incentive for providers to invest more on hospital facilities, equipments and workforces to create greater profits in response to the rapidly increasing health care demands.

Since late the 1980s, large hospitals and specialized hospitals have been established and financed by conglomerates, such as Hyundai and Samsung. In 1989, Asan Medical Center was established by Asan Foundation (social welfare corporation owned by Hyundai), and Samsung Medical Centre was founded in 1994 by Samsung Life Public Welfare Foundation (social welfare corporation). According to Medical Service Act of 2010 in Korea, one of the following paragraphs is allowed to establish medical institutions:

(1) A medical doctor, a dentist, an oriental medical doctor, or a midwife;

(2) The State or a local government;

(3) A legal entity established for the purpose of rendering medical service (medical corporation);

(4) A non-profit corporation established pursuant to the Civil Act or any special Act;

(5) A quasi-government agency under the act on the Management of Public Institutions, a local medical centre under the Act on the Establishment and Management of Local Medical Centres, or the Korea Veterans Welfare and Health Care Corporation under the Korean Veterans Welfare and Health Care Corporation Act

Only medical persons[40] or public entities are permitted to establish medical institutions. Medical institutions owned by individuals (medical persons) can pursue profits that can be

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[40] Medical doctors, dentists, oriental medical doctors, midwives or nurses who hold licenses granted by the Minister of Health and Welfare.

distributed to the investors, as private for-profit institutions. However, public hospitals established by central or local governments and medical corporations which are owned by private corporations are not permitted to pursue profits at all.

Due to the lack of information and no official gatekeeping system, patients prefer to visit large hospitals equipped with advanced health technologies and renowned physicians. Therefore, hospitals that are able to raise capital become dominant in the health care market in Korea.

In 2007, forty-three tertiary hospitals in Korea received 32% of the total health insurance benefit amount reimbursed by the insurer (Jeong, 2010; NHIC & HIRA, 2009). Among the reimbursed amount for the tertiary hospitals, the amount reimbursed to the 'Big Four[41]' hospitals accounted for 30%. In particular, the 'Big Four' hospitals received 25% of the total reimbursed amount for cancer treatment and 40% for cardiothoracic surgery services. According to various statistical data from the NHIC, the HIRA and a member of the National Assembly by Representative Lee, Ae Joo (Choi, 2010), the total cost of health care services rendered by the 'Big Four' hospitals has been doubled from 2001 to 2008[42]. With the rapid increase incomes, the 'Big Four' hospitals expand additional hospital beds for specialized care centres. These numbers show that there is a serious patient concentration at the large-sized hospitals in Korea.

In general, the fees and co-payment for the higher level of institutions are more expensive than others. It means that the patient concentration at these large hospitals inevitably increases the total cost of health care utilisation. On the contrary to the private large hospitals' case, public hospitals are struggling with low management efficiency in Korea. Ironically, to improve the problems of public hospitals, local governments have attempted to contract out their management to the private not-for-profit hospitals (mostly to the tertiary university hospitals) since the mid 1990s. Relevant reports reveal that the financial efficiencies of the public hospitals improved after contracting out, while the access to services has been decreased due to avoidance of Medical Aid patients and hike in patient expenses. Based on the performance evaluation report (1994-1998) of the Korean Association of Regional Public Hospitals, the public hospitals which were contracted out to the private hospitals accepted

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[41] Asan Medical Center (by Hyundai), Samsung Medical Center (by Samsung), Seoul National University Hospital and Severance Hospital (by Yonsei University) in Seoul.
[42] From US$755 million in 2004 to US$1.4 billion in 2008.

less Medical Aid patients and charge more medical fees to their patients [Table 4.12] (Kim, 2003).

As known, one of the most important characteristics of private investment is the pursuant of maximized profits through efficient management. In many cases, efficiency is hardly achieved with equal distribution of resources. However, the primary goal of the public health care is achieving equity as providing equal health care based on patients' need, not their ability to pay. Therefore, without appropriate regulation, the increasing influx of private funds in the form of private for-profit hospitals might negatively influence equal use of health care services.

[TABLE 4.12] PERFORMANCE CHANGES OF GVMT. MANAGED VS. PRIVATE MANAGED HOSPITALS

(Unit: person, KRW)

Classification	Medical Aid Patients (per 100 beds)		Average medical cost per day, per patient		Average medical cost per day, per Medical Aid patient	
	1997	1998	1997	1998	1997	1998
Public Hospital (govt. managed)	6,461	10,996 *(70.2%↑)*	87,789	100,546 *(14.5% ↑)*	74,835	82,613 *(10.4% ↑)*
Public Hospital (private managed)	8,871	7,092 *(20.1% ↓)*	52,367	107,276 (104.9% ↑)	47,105	*99,453 (111.1% ↑)*

Source: adapted from Kim, CY (2003), *Poverty and Health*

4.5.2 Reform Proposal

To promote the health care services industry, the previous government suggested three main themes for future health care reform: 1) invigoration of private insurance[43]; 2) permission of private for-profit medical corporations; and 3) relaxation of mandatory designation of health care institutions. As expected, there have been strong objections toward all of the three topics from the various groups of the society. However, the current health care reform proposal only addresses the second issue on deregulation of hospital ownership in accordance with the government's privatization policy. The recently enacted law which is the "Special Act on the Establishment of Jeju Special Self-Governing Province and the Development of Free

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[43] Literature review on the impact of private health insurance will be addressed in the next chapter. Here, I just like to mention that PHI is one of the important issues for health care reform in relation to the current reform discussion. PHI is not included in the current reform proposal.

International City" in 2006 empowered the idea of the market-oriented health care reform by the Ministry of Strategy and Finance.

Prior to introducing the new reform proposal (bill) to the National Assembly, a comprehensive policy improvement bill based on the Special Act for Jeju Island is waiting for its passage at the National Assembly in 2010[44]. The policy improvement bill for Jeju Island contains health care reform which shares crucial factors of the health care reform proposal prepared by the Ministry of Strategy and Finance. Health care and health industry reform under the policy improvement bill for Jeju Island is designed to build infrastructure for attracting foreign patients as part of the tourism industry in Jeju Island. The current government believes that the new health care reform enables the health care market to build enough capacities through open investment from various sectors for accommodating foreign patients, as a form of "medical tourism" that can serve as an engine for more economic growth in Jeju Island. Therefore, once the policy improvement bill for Jeju Island has been passed by the National Assembly, consequent health care reforms at the national level will be expedited by the current government.

As mentioned, the recent health care reform proposal prepared by the Ministry of Strategy and Finance only addresses the dimension of hospital ownership deregulation as following: 1) eligibility for establishing medical institutions; 2) for-profit/not-for-profit status of medical corporations; and 3) exit options, as summarized in [Appendix 5].

4.5.2.1 Eligibility

At present, the eligibility for establishing medical institutions in South Korea is limited to 1) licensed medical professionals; 2) not-for-profit medical corporations; 3) not-for-profit welfare corporations; and 4) central/local governments. Although most of the medical institutions in Korea are allowed to pursue profits, large-sized hospitals, in a form of medical corporations, are regulated on their ownership status to achieve the public purpose, providing tax benefit incentives for non-for-profit status. However, the recent reform proposal suggests that anyone with a minimum qualification can establish multiple medical institutions, and this is believed to contribute to the diversification of investment sources for medical institutions.

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[44] The bill has been passed in 29 October 2012, employing an expedient by the Ministry of Knowledge Economy and the Ministry of Health & Welfare.

4.5.2.2 For-Profit/Not-for-Profit Status: Open Investment and Profit Distribution

Permission for for-profit status of medical corporations is at the heart of the dispute in this reform proposal. Currently, while private medical institutions (clinics and hospitals) can pursue profits from their business, private medical corporations cannot seek profits at all. The non-distribution constraint has been applied to the medical corporations and the profits from their business should be reinvested into the main business area (medical service related) only. Therefore, it is believed that more investments will be made if the current form of not-for-profit medical corporations is allowed to convert their ownership into other types of for-profit corporations which can distribute their profits to investors.

The reform proposal also includes: 1) relaxation of restrictions on auxiliary business of for-profit/not-for-profit medical corporations; and 2) permission of establishing Management Service Organizations (MSOs) which will support for the auxiliary business of medical corporations.

Deregulation of both the eligibility of establishment of ownership and the permission of for-profit status of medical corporations are expected to promote more vigorous investment on hospitals and straighten the current opaque accounting practice of not-for-profit medical corporations. But there are also concerns that the deregulation encourages an uncontrollable amount of capital inflow which can cause soaring national health care costs.

4.5.2.3 Exit

The reform proposal suggests Merger and Acquisition (M&A) as an exit method of insolvent medical institutions from the health care market. Insolvent hospitals tend to do their businesses with undesirable expedients to be survived in the competition, so that providing a voluntary exit option is believed to be necessary.

4.5.2.4 Issues

If the important characteristics of 'marketization' are competition and choice, it can be said that the current health care system in Korea is market-oriented. The proposal highlights the importance of fair competition among medical institutions and providing more choice for the patients as a consequence, but there is little consideration of how this change affects equity in health care utilisation in Korea.

While the Korean National Health Insurance is a public social insurance program, the program has been developed in a market-oriented environment with private dominant

medical institutions. In Korea, more than 90% of the total medical institutions are privately owned by medical professionals and not-for-profit medical corporations. Although the government has consistently attempted to maintain the ownership nature of the medical corporations not pursuing profits from their businesses, the total number of medical institutions has been rarely rationed (controlled). Therefore, the total number of medical professionals and medical institutions increase every year, and the competition among them for attracting more patients is common and fierce [Appendix 6].

Unfortunately, there is no formal gatekeeping system in Korea, so patients are allowed to visit any levels of medical institutions of their choice. Due to the lack of expert knowledge and information in health care, patients choose hospitals based on the size of institutions and their reputations. Hence the critical factors of successful competition among institutions depend on advanced equipments and facilities that cost a great deal of money, rather than treatment quality itself. For this reason, the neo-liberal government and the service providers believe that the regulation on the ownership of the medical corporations (non-distribution constraint) hinders them from attracting necessary capital from various sources to be competitive for survival.

The government-set low fee schedule for the insurance covered services is one of the major factors of financial straits of medical institutions. According to the medical related associations in Korea, the government-set fees only compensate 70% of the total actual costs of services medical institutions provide (HIRA, 2006). In order to make up for the deficits, medical institutions have been encouraged to increase service volumes of insurance covered treatments or tests as well as to develop various uncovered services. Under this circumstance, there is a high possibility that the disadvantaged patients may not be able to access some necessary but uncovered medical services due to their high prices.

4.6 Summary

After introduction of the universal health insurance program in 1989, it became easier to access basic health care services than before and this is believed to largely contribute to improvement of health and health care in Korea. However, low public spending on health and high OOP payment in combination with the high level of market characteristics of health care service provision could have a negative impact on equal access to health care, especially

for the less advantaged. In the next chapter, socioeconomic related inequalities in health and health care in Korea will be reviewed.

Chapter 5: Equity in Health and Health Care in Korea: Literature Review

5.1 Introduction

As Donaldson et al. (2004) argued, health policy reforms have been greatly influenced by economic or financial pressures, as well as political ideology. During the last half of the 20th century, the top priority of public policy in Korea was economic development and growth in national income, rather than equity in income distribution of the nation's resources. However, joining the OECD as a member country in 1993 and the political democratization in the late 1990s have provided important impetus to broadening the national goals of public policy to equal distribution as well as economic growth. As a member country, the Korean government has taken responsibility for building a reliable and acute social and economic data set and providing data to the OECD for publication. This was followed by abundant analyses and international comparative studies of various aspects of the social and economic performance achieved by Korea. This has enabled both the government and the citizens of Korea to clearly recognize the current socioeconomic status of the country in relation to global standards.

While the country has achieved remarkable economic growth within a short period of time, social indicators have remained relatively unsatisfactory as demonstrated in [Figure 5.1] and [Figure 5.2]. To be specific, indicators for inequalities in income, assets and gender gap in earnings show poor performance.

Greater extent of social and economic awareness of the inequalities within Korea also expedited citizens' demand for improvement. The increased household income and high education attainment as results of the rapid economic growth also made it possible for citizens to pay more attention to the broader aspects of social welfare, such as health care, as well as income and living standards. In addition, the political democratization during the progressive governments played an important role to empower civic and academic groups to make their voice heard, and their collective efforts led to a large expansion of public expenditures on welfare programs[45].

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[45] See the [Table 4.2] in Chapter 4.

[FIGURE 5.1] ASSET GINI'S COEFFICIENT IN KOREA, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Total Asset (incl. house)	0.6132	0.6185	0.6132	0.6229	0.6231	0.6347	0.646	0.6499
Total Asset (excl. house)	0.74	0.7451	0.737	0.7638	0.7714	0.7674	0.7752	0.7871
Real Estate (incl. house)	0.4979	0.5157	0.525	0.5417	0.54	0.5549	0.5749	0.5721
Real Estate (excl. house)	0.5748	0.601	0.5945	0.6344	0.6181	0.6216	0.631	0.6346
Financial Asset	0.6646	0.6887	0.6457	0.6791	0.7038	0.6739	0.683	0.6952

Source: Korea Labour Panel Survey, 2000-2007, Presented by Rep. Lee, Jung Hee (2009)

[FIGURE 5.2] GENDER GAP IN MEDIAN EARNINGS OF FULL-TIME EMPLOYEES AMONG OECD COUNTRIES, 2010

[Unit: %]
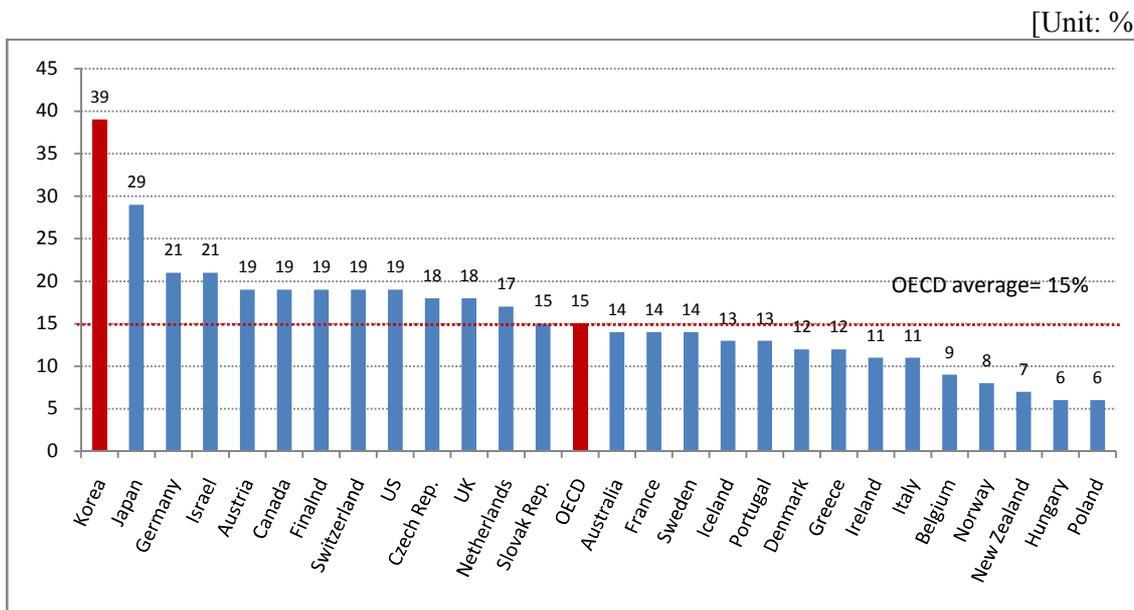
Source: OECD Earning Data Base (2012a)

Thanks to the establishment and the expansion of the universal health care system as well as the economic growth[46], indicators for health outcomes show absolute improvements among Koreans. Despite the improvement in health outcomes, it is often reported that considerable health inequalities, in terms of health outcomes and health care utilisation,

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[46] See the [Figure 4.1] in Chapter 4.

have existed across the different socioeconomic groups in Korea.

The mandatory designation of NHI medical institutions and the absence of an official gate keeping system enable patients to visit hospitals (secondary care) as well as clinics (primary care) without GPs' referrals or long waiting time. However, this involves some serious problems which cause inefficient and unequal distribution of health care resources in association with low benefit coverage and high out-of-pocket (OOP) payments. As stated earlier, Korea is ranked as having the second highest in OOP payments (35.7%) to the total expenditure on health (TEH) among the OECD countries, and this is believed to be a barrier to access and equal quality medical services for the less advantaged patients in Korea.

In line with the high OOP payments to TEH, the public health care spending to TEH in Korea (58.2%, in 2009) has been relatively low compared with other OECD countries (71.8%, the OECD average in 2009). Although equity in health care financing has improved after the big merger of multiple insurers into one single insurer in 2000, the social insurance dominant health care system with high OOP payment ratio entails regressive health care financing.

Most studies on equity in health in Korea have been conducted during the last decade in accordance with the production of reliable health related data. In this section, previous studies on equity in health will be reviewed in terms of health outcomes, health care financing, health care utilisation and private health insurance. The majority of the studies were empirical studies with health survey data, income and expenditure survey, and national health insurance data. Also, a small number of theoretical studies has been found on this topic and will be summarized and synthesized with the empirical studies to highlight implications for the current study.

5.2   Equity in Health Outcomes

As described in Chapter 4, since 1990's the growth of household income and the introduction of the universal health care program, researchers have began to pay attention to differences in health among different socioeconomic groups. In Korean studies of inequity in health outcomes, mortality and morbidity, number of chronic diseases

(including cancer diseases), and self-assessed health (SAH) were the most frequently utilized indicators for health outcomes. Although using SAH as a measure of health condition has long been criticized due to its subjectivity across the individuals or societies, there are also a large volume of research supporting the validity of SAH and other health variables (Holdsworth et al., 2013). In this study, the distributions of the SAH across the SES groups are also consistent with those of other health condition variables as [Figure 7.4] and [Figure 8.4] indicate. Education, household income and occupation status (precarious/non-precarious or manual/non-manual) were used as major indicators for measuring socioeconomic status (SES).

5.2.1 Mortality and SES

In the 1990's, equity studies in health outcomes mainly assessed the relationship between socioeconomic status and mortality. Song (1998) conducted a survey of 759,665 adult males aged 20 to 64 in Korea to examine socioeconomic (income) differentials in all-cause mortality and found that the lowest income group had significantly increased risk of all-cause mortality compared to the highest income group (RR[47] = 1.52). The sample included only government employees so the result was not representative of the general population in Korea. Son (2002) examined the relationship between mortality and SES (occupation, education and deprivation). She found that all the SES factors were strongly correlated with mortality. Although mortality was strongly correlated with occupational status (RR = 1.65 for males and 1.48 for females) and educational status (RR = 5.11 for males and 3.42 for females)[48], there was no association between mortality and occupation after controlling for education. As later studies agreed, education was a stronger factor associated with mortality than occupation. There also existed a strong inverse linear relationship between deprivation and mortality in Son's study (RR = 2.44 for males and 1.94 for females)[49].

Later studies related to the association between mortality and SES showed consistent results with that of Son's study (Khang & Kim, 2005; Khang et al, 2004a,b,c; Khang & Kim, 2006). In those studies, researchers utilized a variety of data sources, such as Korean National Health and Nutrition Examination Survey (KNHANES), Korea Labour & Income Panel Survey, National Census Data, National Death Certificate Data and Social Statistics

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[47] RR: Relative Ratio
[48] Occupation: non-manual to manual
   Education: university to elementary school
[49] Deprivation: deprivation index-based quintiles

Survey. Khang et al. (2004a) found that those with less than 12 years of education had 1.9 times greater mortality risks than those with 12 years of education and more. They also revealed that manual workers had 1.6 times greater mortality rate than that of non-manual workers. The relative ratio of dying among the low income groups (RR = 1.62) and people reporting economic hardship (RR = 1.83) at the time of survey were greater than their counterparts, as well. Kim et al. (2004) had a similar result with Khang, et al. (2004a)'s study above, which demonstrated the higher mortality rates among less educated groups, manual workers, precarious workers and people with low self-rated living standard. Khang et al. (2004b) showed the trends in socioeconomic related mortality in Korea with National Census, National Death Certificate and Social Statistics Survey data from 1990 to 2001. According to their research, relative educational mortality inequalities in males and females had been unchanged, while absolute mortality rates among all educational groups for both genders had decreased during the period. And absolute mortality inequalities among different educational groups for females had widened, while those of males had remained unchanged.

Khang et al. (2004c) conducted a similar study with specified causes of death in relation to education. In general, higher mortality rates were observed among lower educational groups in most causes of death; however, some positive correlations were identified between mortality rates and education on Ischaemic Heart Disease (IHD) among older males and breast cancer among older females. The authors pointed out that relationship between mortality and SES was changing with economic development and specific exposure through the life course; especially, educational attainment affected the mortality rates in some diseases in accordance with changes in social distribution of risk factors in Korea.

Khang & Kim (2005) categorized socioeconomic factors into four groups: 1) biological factors (body mass index, systolic blood pressure, cholesterol and glucose); 2) health behaviours (smoking, alcohol consumption and regular exercise); 3) psychological factors (feelings of sadness and depression, perceived level of stress and marital status); and 4) early life exposures (education and adulthood height), and tested the ability of multiple pathways in order to explain socioeconomic differentials in mortality. The result of the study showed that early life exposures were more powerful in explaining socioeconomic differentials in mortality than other factors. Notably, education was the strongest socioeconomic factor that affected mortality differentials in the study. Another consistent

research results on the relationship between mortality and SES were produced by Khang & Kim (2006). With the KNHANES data of 1998, the researchers revealed that people without education (RR = 2.21), manual workers (RR = 2.73), precarious workers (RR = 3.01) and people with low occupational class (RR = 3.06) were more likely to have higher mortality risks than their counterparts.

Kim et al. (2008a) examined mortality of cancer patients across different income groups and found the lowest income quintile had highest 3-year cancer mortality rate ratio than that of highest income quintile (2.06 for males and 1.49 for females). Jung-Choi & Khang (2009) explored socioeconomic causes for mortality inequalities among Korean children aged 1-9 and concluded that transport accidents and other injuries are the most frequent causes of deaths and these were the largest contributors for socioeconomic mortality inequalities by education attainments and occupations of the parents, accounting for 48.4-64.2% (aged 1-4) and 77.9-90.5% (aged 5-9). Based on Jung-Choi & Khang (2009)'s study, it can be said that the socioeconomic status of the parents might significantly influence the mortality inequalities among the children in Korea.

Kim & Yoon (2008) conducted a study with a different approach comparing health inequalities across the small area units in Korea. They employed the standardized mortality ratios (SMRs)[50] that enable small areas to produce representative health outcome status without expensive actual surveys. The study results demonstrated while Seoul (the capital) and Jeju province had the lowest mean SMRs (84.0 and 90.5, respectively), Gyeongnam, Chungbuk and Gangwon provinces showed the highest mean SMRs (111.5, 108.3 and 108.0, respectively). In addition to the differential among provinces (larger unit), smaller areas within each province had different SMRs, as well. Classifying the smaller areas into 3 groups (low, middle and high SMRs), Seoul and Jeju province included the majority of small areas with low SMRs (76.7% and 65.1%, respectively), while Chungnam province, Pusan and Kangwon province included small areas with high SMRs most (56.4%, 48.0% and 45.0%, respectively). Different from other studies examining the existence of socioeconomic related health differentials, this study provided policy information for health care resource rationing in accordance with the geographical differentials in health.

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[50] SMR = (number of observed deaths / number of expected deaths) X 100

5.2.2 Morbidity and SES

In terms of morbidity inequalities, relevant studies showed consistent results with those of mortality inequalities in Korea. Morbidities were measured by 1) number of acute or chronic diseases; and/or 2) self-assessed health (SAH) in the studies reviewed here. From the studies of Kong & Lee (2001) and Lee & Yoon (2001), SAH was positively correlated with socioeconomic status, such as income, education, house ownership, self-rated social class and income satisfaction. Choi et al. (2004) highlighted that morbidity of chronic disease (CI = -0.01533) and SAH (CI = -0.13163) were slightly regressive (pro-rich inequality) after controlling for age and gender. Compared to the result of other international comparative study, the regressivity of SAH in Korea (CI = -0.0837, adjusted by the method of van Doorslaer et al., 1997) was stronger that other countries, except the UK (CI = -0.1148) and the US (CI = -0.1360) (van Dooslaer et al., 1997). However, there were serious limitations to compare the indices cross the countries, due to the difference of data collection methods and time periods, as well as data analysis methods.

Khang et al. (2004b) investigated the trends of inequalities in health (incidence of acute diseases) and SAH in Korea that has continuously increased overtime in both genders. In particular, they explained that the largest portion of total inequality increase occurred between 1995 and 1999, which was the critical transitional period from the rapid economic growth into the social stratification experiencing the financial crisis in 1997. Kim (2005) reported that SES was strongly correlated with risks of self-reported chronic disease and SAH at all levels of socioeconomic classes; low education and income led to a significant increase in the morbidity of chronic diseases and SAH among Seoul citizens. According to Kim (2005)'s study result, the odds ratios (OR) of chronic diseases and SAH for both males and females were higher among groups with the lowest income and education [Table 5.1]. Like other related studies, education was the strongest factor that contributed to socioeconomic inequalities in health than any other factors in Kim (2005)'s study.

Lee (2005b) examined socioeconomic health inequalities in connection with residential areas in Korea. The sample size was 2,619 adults extracted from the KNHANES data (2001) on a random basis. She found that education and occupation status had independent effects on SAH and the number of chronic diseases. In her study, high school education served as a cutting point to have advantages in health outcomes, as well as managerial or professional occupations. Also, residents in rural area had higher risks to have less healthy status than

[TABLE 5.1] ODDS RATIOS OF MORBIDITY AMONG SEOUL CITIZENS

	Education		Income	
	Male	Female	Male	Female
No. of Chronic Diseases	1.92	1.89	1.12	1.62
SAH	2.41	2.05	1.63	1.32

Source: Kim, H. (2005)

those of larger cities (ORs =1.739 for SAH, 1.482 for chronic diseases). With a labour panel survey data, Bahk et al. (2007) examined that the pattern of the association between SAH and employment status and found that stable employment status increased chances to have better health status than precarious employment or frequent job changes.

In accordance with the accumulation of national household survey data set (the Korean National Health and Nutrition Examination Survey, KNHANES), which includes socioeconomic information, health status (morbidity of diseases and self-assessed health) and health care utilisation, researchers have analyzed the impact of socioeconomic factors on health status in recent years, especially focusing on SAH and incidence of chronic diseases. Kim, et al. (2010), Kim & Ruger (2010) and Park (2010) utilized at least two time points of the KNHANES data and yielded consistent results with the previous studies. Kim & Ruger (2010) found that there were significant SES (education and income) related inequalities for both genders, but more pronounced in females. Another study also revealed significant socioeconomic health inequalities related to age differences. Park (2010)'s study indicated that disparities were found relatively small among younger ages (25-44), but increased later (45-64). Interestingly, socioeconomic morbidity inequalities among older age group (65-84) as lower in her study and this was mainly explained by the convergence effect.[51] Kim et al. (2010)'s study highlighted socioeconomic health inequalities between the genders. In their study, income and education were significantly related to health inequalities for both genders, especially serious among females.

5.2.3 Other Factors Related to Health Inequalities

Some studies examined how well health behavioural factors could explain socioeconomic related health in Korea (Khang & Kim, 2005; Kim & Ruger, 2010; Kim, 2005; Kim et al.,

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[51] Health inequalities have been reduced in their later years of lives, due to 1) increased homogeneous health status among older ages; 2) mortality selection (relatively healthy elderly were survived at that ages; and 3) intense social safety net for the older ages.

2004; Kim et al., 2010). Kim (2005) and Kim et al. (2004) showed that lower socioeconomic groups tended to have more undesirable health behaviours, and this was strongly correlated with higher mortality and/or morbidity ratios. Kim & Ruger (2010) and Kim, et al. (2010) tested the explanation power of health behavioural factors on socioeconomic health inequalities, comparing the results before and after controlling for the factors, and significant changes were found from the results. Ahn et al. (2010) analyzed income-related health inequalities using the KNHANES of 2001 (single year) and also found that ill health was more pronounced among low income groups, which was consistent with the previous studies.

Another study by Shin & Kim (2008) measured 'total health inequality'[52] from the KNHANES (1998, 2001 and 2005) data using EuroQol-5 Dimension Valuation Weights. They found that there was a slight pro-poor inequality in health and the inequality had worsened over time (CIs = 0.0327 in 1998, 0.0393 in 2001 and 0.0924 in 2005). Kang et al. (2008) investigated the relationship between socioeconomic status and healthy life expectancy. The authors revealed the higher the education level, the longer the health life expectancy, and the educational difference in healthy life expectancy was larger than that in life expectancy. There was a study that investigated periodontal health disparities among Korean adults and yielded a consistent result with studies on health inequality in mortality and/or morbidity (Park & Lee, 2010). They, in particular, found that education was the strongest factor associated with periodontal health (ORs = 1 for college education, 1.226 for high school education, 1.435 for middle school education and 2.082 for elementary school education).

5.2.4 Summary

The current review of previous studies on health outcomes supports that there have been considerable health inequalities among different socioeconomic groups in Korea. Mortality and morbidity was negatively related to SES, in terms of education, income and occupation. Among the SES factors, education was most influential in deciding the magnitude of inequalities. While absolute health status has been improved since the 1970s, disparities in health have continuously widened in accordance with increased income disparities after the economic crisis in the late 1990s. Age and gender also served as important contributors for health inequalities. As a result, the magnitude of health inequalities was worse than other

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[52] Total health inequality = within group (SES) disparity + between group (SES) disparity

age groups. Among older females, education was the most significant determinant of ill health and health inequalities across different socioeconomic groups.

5.3 Equity in Health Care Financing

According to the World Health Organization ((2000), hereinafter WHO), fair health care financing indicates that "the risks each household faces due to the costs of the health system are distributed according to ability to pay rather than to the risk of illness." However, some health economists criticized WHO's definition of fairness in health care financing because it cannot discriminate vertical and horizontal equity in health care financing, which can provide important policy implication of progressiveness and regressiveness of financing. According to health economists, equity in health care financing can be measured by either 'vertical equity (individuals or households of different income contribute differently in accordance with their ability to pay)' or 'horizontal equity (individuals or households of the same income contribute the same amount for health care financing)' (Donaldson et al., 2004; Wagstaff, 2001; Wagstaff & van Doorslaer, 2000b). The core concept of the vertical equity is 'progressively financing according to ability to pay' and this enables the society to pursue better equity through positive discrimination in health care financing (Mooney, 2000). In the Korean context, measuring vertical and horizontal equity in health care financing can be useful in evaluating the impact of financing merger in 2000 on the redistributive effect of within group and between groups of employment-based and self-employed insurance.

In most countries, health care is mainly financed from a different mixture of four sources-- direct & indirect taxes, social insurance, private insurance and out-of-pocket (OOP) payments (Maynard, 2001; Wagstaff & van Doorslaer, 2000b). Among the four sources of finance, tax and social insurance sources are public financing, and private insurance and OOP payments sources are categorized into private financing. Public financing is allegedly more progressive than private financing (O'Donnell et al., 2008b; Wagstaff & van Doorslaer, 1992, 2000b; Wagstaff et al., 1999) and the average ratio of public financing to total health expenditure among OECD countries is above 70% (2009).

Public health care financing in Korea has been increasing continuously; however, the ratio is relatively low compared to other OECD countries [Figure 5.3]. The health care system in

[FIGURE 5.3] PUBLIC FINANCING RATIO AMONG OECD COUNTRIES, 2009
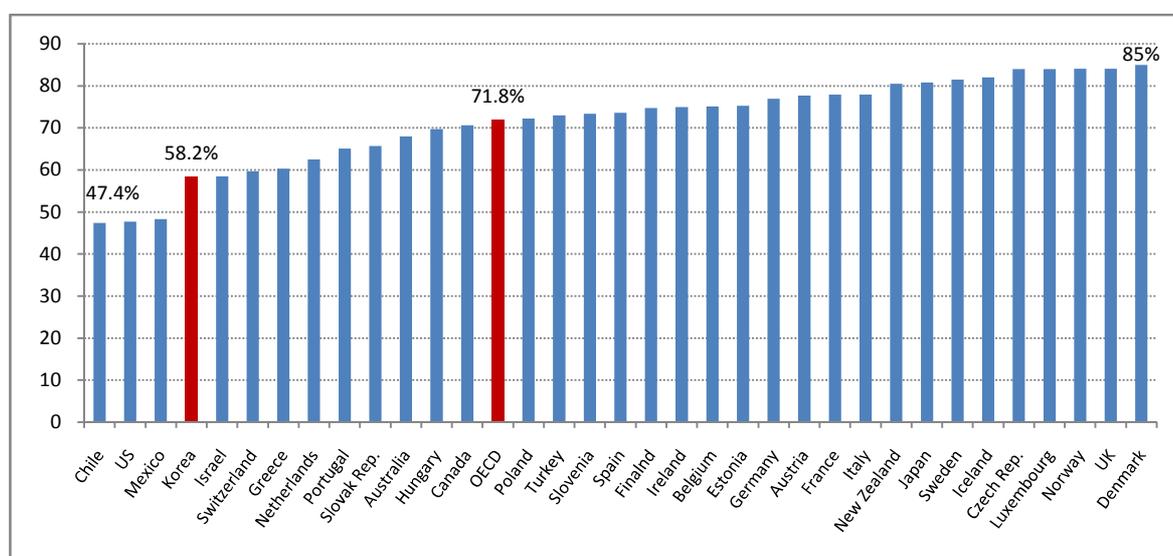
Source: OECD Health Data (2011)

[TABLE 5.2] THE HEALTH CARE FINANCING MIXTURE IN KOREA, 1980-2008

[Unit: %]

	1980	1990	2000	2001	2005	2007	2008
Total Public	*20.1*	*36.5*	*44.9*	*51.7*	*52.1*	*54.9*	*55.5*
Government	15.0	13.3	19.3	24.1	15.9	18.3	16.9
Social Insurance	5.1	23.2	25.6	27.7	36.1	36.6	38.6
Employment-based	5.1	15.8	14.7	17.1	26.4	27.9	29.7
Self-employed	0.0	7.4	10.9	10.6	9.8	8.8	8.9
Total Private	*79.9*	*63.5*	*55.1*	*48.3*	*47.9*	*45.1*	*44.5*
Uncovered Services[53]	72.1	47.8	31.4	25.4	25.1	22.0	21.0
Co-payment	3.4	10.4	14.5	14.4	13.9	13.7	13.7
Private Insurance	0.7	2.0	24.7	3.8	3.9	4.1	4.4
Others	3.7	3.3	4.6	4.6	5.0	5.2	5.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	00.0

Source: Jones, (2010). Health-Care Reform in Korea, OECD

Korea is social insurance-based, so that the financing from the social insurance source accounted for 38.6% out of the total public financing (55.5%) in 2008 [Table 5.2]. As [Table 5.2] demonstrates, private health care financing including private insurance formed almost half (44.5% in 2008) to total health care financing, while the ratio has been decreasing. The big health care financing reform in 2000, which merged more than 350 medical societies into one single insurer, had changed the financing system, achieving more

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[53] Approved medical services with safety and efficacy, but not covered by the KNHI due to low cost-effectiveness—mostly expensive new technologies or beauty purpose

equality within and between the multiple insurers. Before the merger, each insurer was independently operated with an individual risk pooling and contribution collection system. Therefore, people with similar incomes paid differently, as well as treated differently with similar health problems, depending on which insurance plan they belonged to. Accordingly, studies on equity in health care financing in Korea has mainly focused on the impact of the health care financing reform after the year 2000.

5.3.1 Before the Merger

There were a few studies on equity in health care financing before the merger in 2000, and most of them were about the high ratio of OOP payments in the program. However, Park et al. (1996) conducted a survey of 1,447 employees who belonged to an employment-based medical society in Seoul in 1994. The survey questionnaire asked demographic information, subjective health status and health care utilisation for the last one month, and they collected personal information that was matched with the health insurance data to retrieve the details of the respondents' insurance contribution amounts. The merged data was analyzed with the Kakwani and the Suits indices which indicate income-related vertical inequality in health care financing. For social insurance financing, the Kakwani index yielded -0.2396 and the Suits index did -0.3213, indicating regressive financing. Financing from OOP payments was also regressive, showing -0.2690 and -0.3424, respectively [Table 5.3]. According to the study, the overall health care financing, excluding the analysis of tax financing, was regressive. While this study was the most comprehensive analysis on equity in health care financing in Korea before the merger, the result couldn't be generalized due to the sampling bias-- the data was collected from one medical society located in Seoul, out of more than 350 medical societies at that time.

Other studies on equity in health care financing before the merger were analyses on financing from OOP payments. Shin (1997) analyzed the composition of OOP payments from 1983 to 1996, as [Table 5.4] demonstrates. Due to the expansion of the NHI as a universal health care program, the total health care expenditure, including OOP payment, increased dramatically in 1989. However, the OOP payment ratio decreased in the 1990s, in accordance with expansion of benefit coverage of KNHI.

Kim et al. (1999) also investigated the magnitude of patients' cost-sharing for hospital services with the health insurance claims data and the hospital management data from the year of 1997, and found that 51.7% of the total revenue of the sample hospitals came from

[TABLE 5.3] SUMMARY OF THE KAKWANI & SUITS INDICES

Authors	Data/Year	Indices	Sources of Health Care Financing				
			Direct Taxes	Indirect Taxes	Social Insurance	OOP Payments	Total Financing
O'Donnell, et al. (2008b)	HIES[54]/2000	Kakwani	0.2683	0.0379	-0.1634	0.0124[55]	-0.0239
Choi, et al. (2005)	NHI[56] & KNHANES[57]/ 2004	Kakwani	0.1279	-0.1465	-0.0690	-0.1722	-0.0607
Choi, et al. (2004)	HIES/ 1996 & 2000	Kakwani (1996)	0.12361	-0.09049	-0.16089	-0.13719	N/A
		Kakwani (2000)	0.1279	-0.1465	-0.0690	-0.1722	-0.0607
Shin, et al (2004)	HIES/2000	Kakwani	0.2220	-0.0433	-0.0397	-0.1024	-0.0638
Mun (2004)	HIES/2000	Kakwani	0.22573 (tax total)		-0.08521	-0.12241	0.066204
		Suits	0.22912 (tax total)		-0.10916	-0.1416	0.05722
Yang, et al. (2003)	HIES/ 1996- 2000	Kakwani (1996)	0.1719	0.0477	-0.2166	-0.0166	-0.0518
		Kakwani (2000)	0.2683	0.0379	-0.1634	-0.0239	-0.0239
Park, et al. (1996)	Survey/1994	Kakwani	N/A	N/A	-0.2396	-0.2690	-0.2596
		Suits	N/A	N/A	-0.3213	-0.3424	-0.3356

[TABLE 5.4] THE COMPOSITION OF OOP PAYMENTS IN KOREA, 1983-1996

	Total OOP	Co-Payment	Uncovered Services
1983-1988	*40.5%*	15.1%	25.5%
1993	*52.4%*	16.1%	36.3%
1995	*46.1%*	14.2%	31.9%
1996	*43.9%*	14.8%	29.1%

Source: Shin, J. (1997)

patients' OOP payment -- 67.4% of outpatient and 40.3% of inpatient services. Both studies(Kim et al., 1999; Shin, 1997) pointed out the high OOP payment ratio and the need to improve equity by expanding public health care financing on essential medical care.

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[54] Household Income & Expenditure Survey
[55] Statistically not significant
[56] National Health Insurance Data
[57] Korean National Health & Nutrition Examination Survey

5.3.2 After the Merger

After the merger, researchers began to conduct full-scale investigation on equity in health care financing from the mixture of four sources[58]. First, Lee (2003) examined the changes of contribution burden among those who were insured under the employment-based system before and after the merger. She concluded that equity in health care financing among them improved. The contributions by individuals with low income decreased and those with high income increased. Also, while the employees of the central/local governments and private school teachers with higher incomes paid more, industry workers with lower incomes paid less as a result of the merger. However, Lee's study didn't include an analysis of equity in financing among the insured of the self-employed. Kang (2004) also examined the impact of the merger on households' contribution for both the employment-based and the self-employed insured. With the Gini coefficient and the Concentration Index analyses, she concluded that the vertical equity in health care financing was improved in both the employment-based and the self-employed insured after the merger. Nevertheless, the improvement among the employment-based insured was definitely more significant than that of the counterpart.

Since 2003, internationally comparable researches on equity in health care financing had been conducted employing the methodology of Wagstaff & van Doorslaer (Wagstaff et al., 1991b,c; Wagstaff & van Doorslaer, 1992). O'Donnell et al (2008b), Choi et al. (2005), Shin et al. (2004a), Mun (2004), Choi et al. (2004) and Yang et al.(2003) analyzed equity in health care financing with the Kakwani and/or Suits Indices as measures of vertical equity-- which is expressed as progressiveness or regressiveness of health care financing. The study results were consistent with those of other countries. As [Table 5.3] demonstrates, direct tax financing was the most progressive across the studies, and indirect tax financing was regressive in Korea. (Choi et al., 2004; Choi & Shin, 2005a; Shin et al., 2004a). Choi et al. (2005a) argued that the different criteria of indirect taxed items or utilisation of different sources of data made opposite outcomes. Like other countries with social insurance-based health care systems, financing from social insurance was regressive across all the studies. Because the sources of data and the collection time points varied, the degree of regressiveness was different. However, the studies including multiple time point data (Choi et al., 2004; Yang et al., 2003) clearly showed the positive impact of the merger in 2000 on

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[58] Tax, social insurance, private insurance and OOP payment

the improvement of equity in social insurance financing from -0.16089 to -0.0690 and from -0.2166 to -0.1634 [Table 5.3]. Except for the O'Donnell et al, (2008b), financing from OOP payments was also proven to be considerably regressive across the studies. Although each source of health care financing had different level of progressiveness or regressiveness, the majority of studies showed that the total health care financing in Korea was regressive. These findings implied that high dependency on social insurance and OOP payment financing with low tax financing led to regressive health care financing in Korea, while the regressiveness had been decreasing.

A number of studies found income-related health care spending by household income level when examining OOP payments in Korea. With the KNHANES data of 1998, Kim (2004) found that the patients in the lowest income decile spent 6 times more OOP payments. In line with Kim (2004)'s study, Ruger & Kim (2007) also suggested that the 1st income quintile spent 6 times more OOP payment than the 5th income quintile. Also, among those with 3 and more chronic diseases, low incomes had the highest OOP payment burden ratio (20%) which is 5 times more than that of high incomes. Shin et al. (2004b) discovered that the health care expenditure increased as household income increased, while the ratio of health care expenditure decreased for all levels of household income. This finding implied that the household with less ability to pay should reduce health care spending more sensitively when their ability to pay level was lowered. Lee & Kim (2006) presented that high incomes had a tendency to pay more contribution, as well as use more services than their counterpart (CI's were positive for the both). In summary, previous studies on households' OOP payments shows that income-related inequity exist among the different income groups in Korea.

In recent years, researchers have paid attention to catastrophic health care spending by income group in Korea. Lee (2005c) utilized the 'Threshold Approach'. This approach was developed by Wagstaff and van Doorslaer to examine the incidence and the intensity of catastrophic health expenditure among different income groups and their impact of povertization on poorer households. Lee (2005c) concluded that 1) the incidence and the intensity of households with catastrophic health care expenditure[59] increased during the target years (1997-2002) with some variations by year; 2) the incidence and the intensity of catastrophic health care expenditure were higher among low income households and; 3) the

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[59] In this study, Lee (2005c) defined catastrophic health care expenditure as households' spending of 15% and 20% or more on health care (He uses two thresholds for his analysis).

poverty impact of the incidence and the intensity of the catastrophic health care spending was focused on the low income groups. Kim & Huh (2008) and Kim & Yang (2009) also conducted studies on catastrophic health care expenditure with the Household Income & Expenditure Survey (HIES) data from the 1980s to 2005. Both of these studies found that: 1) the health care expenditure disparity among different socioeconomic groups increased since 2000 in accordance with growing income disparity in Korea; and 2) catastrophic health care expenditure increased among lowest income quintiles (the 1st and the 2nd). Unlike Lee's study in 2005, Kim & Yang (2008) and Kim & Huh (2009) used the definition of catastrophic health care expenditure from Xu et al.'s study (2003),which specified the definition as households' spending on health care larger than 40% of their disposable income.

5.3.3. Summary

Based on previous studies, health care financing in Korea was slightly regressive before the merger; however vertical equity of health care in financing improved after the merger of multiple insurers in 2000. Although universal health care has been implemented in Korea for more than 30 years, the high portion of social insurance and OOP payment financing has brought about a bit regressive financing as a whole. This result was consistent with other countries with social insurance dominant health care systems, such as Germany and the Netherlands. For that reason, the majority of health care financing researches in Korea concentrated on the analyses of vertical inequality of households' OOP payments and policy recommendations.

While studies on equity in health care financing had been conducted based on the internationally comparable methodologies, the Household Income & Expenditure Survey (HIES) data most frequently utilized has considerable limitations. Due to the characteristics of a voluntary self-report survey, the HIES has a high rate of dropouts, missing items, and recall bias. Therefore, although the majority of the studies showed similar trends in health care financing, some studies presented opposite results that may have been due to different study design and data handling.

5.4 Equity in Health Care Utilisation

Owing to universal health care in Korea, the quantity of health care utilisation is equitable compared to other developed countries, showing neutral or pro-poor inequalities for both primary and secondary care utilisation (Lu et al., 2007). Despite the universal health care system, the limited benefit coverage of the public health insurance program threatens equal access to quality health care in Korea. The high OOP payment ratio, including co-payments and uncovered services fees, has been believed as one of the strongest barriers to achieving horizontal equity in health care utilisation (equal treatment for equal need) in Korea. In order to measure horizontal equity in health care utilisation, the majority of the studies reviewed here employed the Horizontal Inequity Index (HIwv) which was developed by Wagstaff and van Doorslaer. In addition to the HIwv Index, the Le Grand Index (HI$_{LG}$) and the Concentration Index (CI) were also utilized.

5.4.1 Quantity and Quality of Health Care Utilisation

In 2003, the first internationally comparable study was conducted using the triennium household health survey data with a nationally representative sample that had been developed since the late 1990s. The KNHANES data contains socioeconomic, health status and health care utilisation information. Kwon et al. (2003) investigated horizontal equity in health care utilisation in Korea for the first time with the KNHANES data using the HIwv Index. They found that outpatient care (number of outpatient visits) showed slightly pro-poor inequity[60] after standardizing needs, such as number of chronic diseases and self-assessed health (HIwv = -0.008). For inpatient care (number of inpatient days), the result indicated pro-poor inequalities (HIwv = -0.162), and this was more equitable than other OECD countries based on the study result of van Doorslaer and Wagstaff (van Doorslaer et al., 2000). However, the rich spent more on health care than their counterparts after controlling for health care needs, and this meant the quality or intensity of health care utilisation was pro-rich (HIwv = 0.064). Compared to Finland, the UK and the US (HIwv = -0.021, -0.020, and 0.009, respectively), quality of health care utilisation in Korea was inequitable-- more favourable to the rich. Kwon et al. (2003)'s study was expanded to

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[60] Pro-poor inequality means that the poor use more health care services after standardization of their health care needs.

compare with other high income Asian countries, such as Hong Kong and Taiwan[61] (Lu et al., 2007). Although the three countries have different health care financing and delivery systems, the HIwv indices, which were standardized by their own health care needs, can be used to compare the basic status of equity in health care utilisation. For the total number of outpatient visits, Hong Kong and Taiwan showed slight pro-rich inequity (HIwv = 0.0927 and 0.0209) while Korea was fairly equitable (HIwv = -0.0090)[62]. Among the total outpatient visits, specialist visits in Hong Kong only indicated pro-poor inequity probably due to its tax-based financing system. On the contrary to this, outpatient visits for higher levels of institutions in Korea was favourable to the rich (HIwv = 0.0690 for general hospitals and 0.2236 for tertiary hospitals). For inpatient care, there was pro-poor inequity across the three countries. However, quality of health care utilisation was not reflected in Lu et al. (2007)'s study.

Kim et al. (2007) surveyed 1,480 residents of Gwangju and S. Jeonra Province in 2006 to measure inequalities of quantity and quality of health care utilisation. The quantity of health care utilisation was defined by the number of outpatient visits and inpatient admissions. The number of inpatient days were slightly pro-rich or almost equitable, except outpatient visits for tertiary and oriental medicine hospitals (HIwv = -0.050 for the total outpatient visits). However, as [Table 5.5] indicates, service utilisation of higher level of medical institutions, preventive care, medical checkups and expensive tests, which require more OOP payments, showed obvious pro-rich inequity. Unlike previous studies, inpatient

[TABLE 5.5] HIwv INDICES FOR QUANTITY AND QUALITY OF HEALTH CARE UTILISATION IN KOREA

Category		HIwv	Category		HIwv
Outpatient Visits	General Hospitals & above	0.140	Outpatient Services	Blood Test & X-rays	0.030
	Hospitals	-0.012		CT	0.142
	Oriental Hospitals	0.157		MRI	0.153
	Dental Hospitals	-0.022		Ultrasonography	0.114
	Clinics	-0.076		endoscopy	0.112
	Health Centre	-0.391	Outpatient expenses		0.129
Purpose of Outpatient Visits	Diagnosis & Prescription	0.005	Inpatient Admission		0.006
	Herbal Medicine	0.169	No. of Inpatient Admissions		-0.069
	Vaccination	0.076	Total Admission Days		-0.210
	Medical Checkups	0.164	Inpatient Expenses		-0.023

Source: Kim, Oh, Moon, & Kwon (2007)

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[61] This study used different year of survey data for each country; Hong Kong (2002), Korea (1998) and Taiwan (2001)

[62] Probability of use of outpatient visits or inpatient admissions

expenses were equitable in Kim et al. (2007)'s study. Kim & Choi (2007) reported a consistent result with Kim et al (2007)'s study using the same health care utilisation variables with a different household survey data (the KNHANES data of 2005).

Lee & Kim (2006) and Lee (2010) conducted similar studies on equity in health status and utilisation with the national health insurance and the KNHANES data. The both studies employed the Le Grand Indices (HI_{LG}) for analyses. Lee and Kim (2006) found that there were income-related health inequalities, which means the poor need more health care, but the utilisation of health care after consideration of health status was concentrated on the rich. Lee (2010) extended Lee & Kim (2006)'s study with an updated survey data and concluded that there still existed pro-rich inequity in health care utilisation after consideration of health status (SAH and the number of chronic diseases) while quantity of health care utilisation for the low incomes was improved to the pro-poor direction.

5.4.2 Health Care Utilisation by Ill Health

A considerable amount of research has been done to measure equity in health care utilisation by health status or disease. Choi et al. (2004) found that there was pro-poor inequalities in chronic diseases (HI_{LG} = -0.040), while self-assessed health (HI_{LG} = 0.07727) was favourable to the rich. However, according to Choi et al. (2004), health care utilisation in Korea was less inequitable, compared to other developed countries [Table 5.6].

Equity in health care utilisation of patients with cancer, who may need intensive and long term treatment, attracted increasing attention from the researchers. Kim at al. (2005a)

[TABLE 5.6] THE HI_{LG} INDICES COMPARISON AMONG SELECTED COUNTRIES

Country	Chronic Diseases	Self-assessed Health
Denmark	-0.094	0.051
The Netherlands	-0.010	0.066
The UK	0.052	0.228
Ireland	0.015	-0.100
France	-0.093	-
Spain	0.042	0.204
Switzerland	-0.110	0.033
The US	-	0.202
Japan	-	-0.004
Korea	*-0.040*	*0.076*

Source: Choi et al. (2004)

collected national health insurance claims data during the year of 2000 and investigated income-related inpatient health care service utilisation status among the residents of Jeju Island with a concentration index (CI), and found that there existed inequity across cancer patients with different income levels. The inequity in health care utilisation in this study took account of both quantity (admissions) and quality (expenses) of services. Interestingly, there were pro-rich inequity in inpatient service utilisation of facility outside of Jeju Island and the total service utilisation of facility inside and outside of Jeju Island, while inpatient health care utilisation of facility within Jeju Island was equitable. The authors explained that Jeju Island is a small and remote area with limited health care resources, so that there was a high probability that the residents needed to travel to larger cities for higher quality care. Another study assessed educational difference in health care utilisation during the last year of cancer patients (Choo et al., 2007). According to the study result, cancer patients with college education spent more than 2 times during the last year of life than patient with no education at all, such as total treatment expenses, inpatient expenses, outpatient expenses and drugs. In addition to this, cancer patients with college education were more likely to access higher level of institutions, especially to tertiary hospitals (ORs = 6.09 for the big four hospitals & 2.56 for tertiary hospitals within Seoul). Kim et al. (2005a) and Choo et al. (2007)'s studies were conducted before the implementation of benefit coverage expansion for cancer patients in September 2005; however, Kim et al. (2008b) compared the impact of before and after the coverage expansion policy on equity in health care utilisation of cancer patients. Kim et al. (2008b) reported that the quantity of health care utilisation increased in general, but the ratio of health care utilisation was still higher among high incomes. There existed pro-rich inequity in health care utilisation of outpatient visits, outpatient expenses and inpatient expenses while inpatient days were equitable, due to the generous benefit expansions. Especially, inequity in outpatient expenses was outstanding because large part of expensive new technologies/drugs for cancer treatment remained uncovered, depending on the patients' ability to pay. The above three studies, which were conducted with the national health insurance data only, on equity in health care utilisation of cancer patients implied that there were significant unequal health care utilisation across different socioeconomics groups in Korea. The actual inequity would be severe if uncovered services were included in those studies. However, due to the limited period of time after the implementation of the new benefit coverage expansion policy for cancer patients, no comprehensive policy impact was observed in Kim et al. (2008b)'s research.

Dental care is one of the most unequal areas of health care utilisation across the world (van Doorslaer & Masseria, 2004). Consistent with the studies among other countries, Shin & Kim (2006) analyzed that there was consistent pro-rich inequality (HIwv = 0.0536) in dental care utilisation in Korea, highlighting more inequity in rural areas, due to lack of dental facilities.

In addition, preventive medical services, such as cancer screening and regular medical checkups, were used to measure equity in health care utilisation in Korea. In particular, Chun et al. (2007) investigated the disparity in participation in health examination by SES among adults in Seoul; and Chun & Kim (2007) analyzed socioeconomic inequalities in preventive care among the elderly. The both studies uncovered that people with lower socioeconomic status were less likely to utilize preventive care services than their counterparts. Chun & Kim (2007) also reported a geographical disparity of preventive care use among the elderly, especially unfavourable to the elderly living in rural areas.

5.4.3 Summary

Although there have been few variations among the results of reviewed literature in this part, it can be concluded that significant and consistent horizontal inequity in health care utilisation were observed in Korea. Medical services that entail high user fees showed pro-rich inequity, such as utilisation of tertiary hospitals, expensive diagnostic tests, preventive care, end of life care and cancer treatment. On the other hand, quantity of health care utilisation showed pro-poor inequity owing to universal coverage of basic care.

5.5   Private Health Insurance

Although private health insurance in Korea in 2007 accounts for 4.1%[63] of the total health expenditure which is relatively lower than the OECD average (5.7%), private health insurance shares almost 1% of GDP[64] (Jung, 2011; OECD, 2010). Compared to other OECD countries which utilize private health insurance as a form of complementary type, sharing 1% of GDP in Korea is higher than the OECD average of 0.4% (Jung, 2011). Before the 2003 and 2005 reforms of private health insurance in Korea, only general insurance companies could sell complementary private health insurance with indemnity

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[63] Expenditure basis-- not health care financing basis
[64] Private health insurance market basis

plans, while life insurance could sell private health insurance as a form of fixed-sum plans. After the private health insurance reform of 2005, life insurance companies along with general insurance companies have been able to sell complementary private health insurance with indemnity plans, which is alleged to encourage more use of medical service as compensating actual expenses by patients than the other type of benefit coverage (Huh & Lee, 2007; Lee, 2009). After the change of health insurance policy in 2009, the compensation rate of the indemnity plans increased up to 90% of the actual expenses, including co-payments of public health insurance.

Since the deregulatory reform of 2005, the ratio of private health insurance financing to TEH has been increasing rapidly, as shown in [Figure 5.4]. In terms of financing of the private health insurance market, the total financing size was about 12 trillion KRW (US$10 billion) and this amount was as large as 40% of the total financing size of National Health Insurance (about 30 trillion KRW = US$25 billion) (Lim, 2010). In particular, the market of private health insurance with indemnity plans has reached 2.5 trillion KRW (US$2 billion) in 2009, which has been tripled since 2005.

As mentioned in an earlier part of this chapter, the Korean government attempted to expand the roles of private health insurance, as demonstrated by the Ministry of Strategy and Finance's recent proposal to deregulate health care reform. Because health care needs are increasing faster than the public insurer's capacity to expand its benefit coverage, the recent

[FIGURE 5.4] PRIVATE HEALTH INSURANCE FINANCING GROWTH IN KOREA, 2000-20012

(Unit: Million US$)
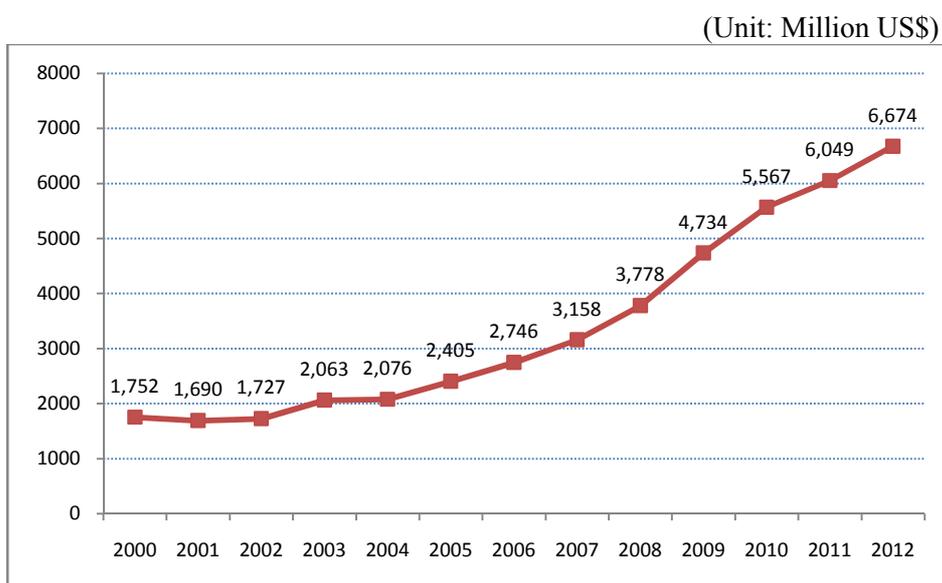
Source: OECD Health Data (2013)

governments have planned to invigorate the roles of private health insurance to meet the needs, minimising expansion of public spending on health care. As expected, the opponents criticize that the idea will aggravate insurer's financial burden by increasing utilisation and widen inequalities between the rich and the poor in health care utilisation (Cho et al., 2010; Huh & Lee, 2007; Kim & Lee, 2006; Yoon et al., 2005). However, there is a paucity of comprehensive empirical research on the impact of private health insurance on health care expenditure, utilisation or equity yet.

5.5.1 Descriptive Analysis of Private Health Insurance Statistics

Most studies on private health insurance in Korea have been descriptive with basic statistics, such as the percentage of private health insurance policy holders and the number of policies each household or individual possessed. Yoon & Kwon (2008) conducted a study on policy purchase and utilisation of private health insurance with the relatively large sample size that was extracted from the national health insurance claims data. Yoon & Kwon (2008) estimated that 63.1% of the total population held at least one private health insurance policy. More than 70 percent of the sample in their 30s and 40s had at least one private health insurance policy. Major findings of the study were: 1) income level was not a significant factor in purchasing private health insurance policies; and 2) there was no correlation between holding private health insurance and utilizing health care. The study also found a difference in utilisation of health care between people with indemnity plans and fixed-sum plans. However, this study didn't specify the kinds of private health insurance benefit coverage in their analysis, which is likely to influence the use of health care by income level. Another study by Chung et al. (2009) examined the financing size of private health insurance and the rate of policy holders from the Korean Health Panel Survey of 2008. They found that the financing size of private health insurance was 5 trillion KRW (US$4.2 billion) in 2002 and 7.5 trillion KRW (US$6.3 billion) in 2005. On average, 76.1 percent of households (or 66.49% of individuals) purchased at least one private health insurance policy and each household holds 3.38 policies on average. The 40s and 50s age groups purchased more private health insurance policies than other age groups. In 2010, Korea Insurance Research Institute conducted a insurance customer survey and revealed that 33.8% of the respondents held at least one private health insurance policy (indemnity plans only) and 43.7% of the respondents who didn't hold any private health insurance policy had an intention to purchase private health insurance policy in the near future (Byun & Park, 2010). In Byun and Park (2010)'s study, urban residents, married, white collar workers,

housewives, individuals in their 30's, and higher income group were more likely purchase private health insurance. This result was inconsistent with Yoon & Kwon (2008)'s study, however. Huh & Lee (2007) estimated the size of additional expenditure of the expansion of private health insurance with indemnity plans. Applying 50~80% of benefits coverage and -0.2~-0.5 price elasticities, the public insurer would spend 426 billion KRW (US$355 million) to 1.7 trillion KRW (US$1.4 billion) more, in accordance with increased utilisation of health care services by private insurance policy holders. The authors concluded that the expansion of private health insurance with indemnity plans that cover co-payments and out-of-pocket payments together would increase the total health care expenditure and income-related inequalities in health care utilisation.

Previous studies on private health insurance were mostly descriptive and showed inconsistent results due to a lack of nationally representative data. However, the studies indicated that a considerable number of households purchased private health insurance and that the private health insurance market has been increasing rapidly despite being covered under the universal public health insurance.

5.5.2 Empirical Analyses on Private Health Insurance

A limited number of empirical studies on the impact of private health insurance on health care utilisation or equity currently exist in Korea. Yoon et al. (2005) conducted a health survey targeted to the citizens of Pusan (the second largest city in Korea) and found that females, economically active ages (especially aged 35 to 49), people with better health status/experience of health checkups were more likely to purchase private health insurance. Also, the study revealed incomes and education attainments were positively associated with probabilities of purchasing private health insurance. Park & Kwon (2009) examined the attitude toward the expanded roles of private health insurance and 54% of the respondents showed in favour of the expansion. The factors that affected the attitude were gender, age, subjective health status, chronic diseases, income, health behaviours and disability status. The respondents with high incomes and better subjective health status were in favour of the expansion of private health insurance, while the respondents with chronic diseases, bad health behaviours (drinking and smoking), and disabilities expressed a negative attitude. Based on the analysis of the attitude toward the expanded roles of private health insurance among groups with different conditions, the authors concluded that the considerable portion of the citizens recognized the concept of the 'cream skimming' process in accessing private

health insurance policies in Korea.

Recently, Cho et al. (2010) studied the impact of private health insurance on health care utilisation with a nationally representative health data (the KNHANES, 2005). The study investigated the impact of private health insurance (number of plans and premiums) on the utilisation of inpatient/outpatient care, unmet need satisfaction and out-of-pocket payment reduction. According to the study results, the number of private insurance policies increased utilisation of both inpatient and outpatient care, while the amount of the private health insurance premiums negatively impacted on the utilisation. This result implied that the utility of private health insurance was not cost-effective in the present study. For the analysis of unmet needs, private health insurance, together with public health insurance, had positive impact on satisfying unmet needs of the policy holders. This result meant that the current complementary form of private health insurance would be desirable rather than expanding its roles. Lastly, the authors reported that private health insurance failed to reduce out-of-pocket payments of the policy holders, but increased the amount instead.

5.5.3 Summary

The majority of citizens in Korea have at least one private health insurance policy and the private health insurance market has been growing fast owing to the recent deregulatory insurance policy changes. However, the impact of private health insurance on expenditure, utilisation and equity in health care has not been reviewed enough. For more constructive discussions on the deregulation of the private health insurance policy, more specific and comprehensive research based on reliable data is needed.

5.6 Critical Analysis of the Literature Review

The most important finding from the review of previous studies on equity in health is that considerable SES-related inequalities have existed and they are getting wider in accordance with the increase of income inequalities since the late 1990's in Korea. In particular, the private dominant health care provision and the high rate of private health care financing serve as serious barriers to equal access to quality care for all patients regardless of their socioeconomic status.

After the merger of multiple health insurers into one single payer in 2000, vertical equity in health care financing among the employment-based insured has been improved, while it is far behind among the self-employed due to the lack of a proper system to detect accurate incomes of the self-employed. On top of this unequal public health care financing, the rate of private health care financing is still the one of the highest among the OECD countries, indicating 44.5%. As known, health care financing from the private sector is highly regressive, this means that the poor spend a greater portion of their disposable income on health care than the rich in Korea.

Introduction of universal health insurance in the 1970s enabled people to access more health care services than ever before. As a result, the quantity of health care utilisation is equitable or in favour of the poor while the quality of health care utilisation clearly shows pro-rich inequity. Inequity in health care utilisation, in terms of quality care access, is strongly associated with the high rate of out-of-pocket payments which include user fees for uncovered medical services. Especially, considerable research reported that low income and less educated patients with severe conditions, such as cancers and/or multiple chronic diseases, are less likely to receive equal treatment due to the high out-of-pocket payment rate.

Although there is no clear evidence that shows a positive relationship between equity in health care utilisation and equity in health outcomes yet, SES-related health inequalities are also observed in the majority of the literature in Korea. Especially, education, which is positively correlated with future income levels, is the strongest factor in increasing or decreasing probabilities of getting better health outcomes.

As described in detail in the previous part of this chapter, the recent deregulatory health care reform proposed by the Ministry of Strategy and Finance will allow ownership conversions from private not-for-profit medical corporations (larger sized for-profit hospitals) into private for-profit institutions and possibly expand the roles of private health insurance in the near future in Korea. The new plans have high possibilities in increasing private financing in health care through creating more expensive non-covered services and lowering private insurance payment (or compensation) rates in order to maximize profits and those are expected to negatively affect equity in health/health care.

Part III   Empirical Analysis:

Socioeconomic Inequity in Health Care in Korea

Chapter 6:   Methodology

6.1   Data Used in the Analysis: Korea Welfare Panel Study

6.1.1   General Features

The Korea Welfare Panel Study (KOWEPS) is a nationally representative survey panel data collected since 2005 on an annual basis to grasp the rapid changes of socioeconomic conditions among the less advantaged and to provide reliable statistical evidence in developing relevant welfare policies. As of 2012, five waves (2005, 2006, 2007, 2008 and 2009) of the panel survey data have been published. The KOWEPS data embraces an extensive range of welfare related information on demographics, income, expenditure, assets, debts, education, employment and welfare benefit uptake, as well as health and health care [Table 6.2]. For this analysis, the first and the forth waves of the KOWEPS data were used.

In general, the Korea National Health and Nutrition Examination Survey (KNHANES) data has been used for the most of the previous equity analyses in health care utilisation in Korea as the KNHANES data contains detailed health and health care utilisation information (Choi et al., 2004; Choi & Shin, 2005b; Choi et al., 2005; Chun & Kim, 2007; Kim et al., 2005b; Kim & Choi, 2007; Kwon et al., 2003; Lee, 2009; Lee, 2010; Lu et al., 2007; Shin & Kim, 2006). However, the KOWEPS data is more appropriate for the current analysis with the reasons: 1) the KOWEPS data includes more comprehensive socioeconomic information as well as health care utilisation and need information; and 2) the KOWEPS is panel data which enables meaningful comparisons between individuals over time. This is one of the first studies on equity analysis of health care utilisation using the KOWESP.

6.1.2   Sampling and Panel Weights

The KOWEPS data was created using two-stage stratified cluster sampling from 90% of the Census Korea data of 2005. At first, 517 sampling districts were extracted by probability proportional to size sampling from 96 strata which were constructed by the combination of three base variables: 1) 16 regions (large provinces); 2) 2 district types (apartment/non apartment); and 3) 3 housing types (single/multiplex/apartment). Out of the 517 sampling districts, 30 sampling districts located in small islands and special facilities were excluded

[TABLE 6.1] PANEL RETENTION RATES OF THE KPWEPS

	Year of Data Collection	No. of Households	Household Retention Rate	No. of Individuals	Individual Retention Rate
1st Wave (2006)	2005	7,072	100%	14,463	100%
2nd Wave (2007)	2006	6,511	92.06%	13,083	90.46%
3rd Wave (2008)	2007	6,128	86.65%	12,191	84.29%
4th Wave (2009)	2008	5,935	83.92%	11,909	82.34%
5th Wave (2010)	2009	5,675	80.25%	11,400	78.82%

Source: Korea Welfare Panel Study (KOWEPS) Users' Guide (2010)

due to difficulties in access and high costs. From the 487 sampling districts, 30,573 households were taken at the first stratified sampling process.

At the second stage, 7,000 households were planned to be selected from the Minimum Cost of Living Survey of 2006 by stratified systematic sampling according to household income level. Among the 7,000 households, 3,500 households were selected from below 60% of median income (low-income households) and another 3,500 households were selected from above 60% of median income (non low-income households). Based on the above 7,000 sample households, the survey was completed with 14,463 individuals among 7,072 households (3,283 low-income households and 3,789 non low-income households). The survey questionnaires were comprised of three parts which were: 1) for households (household heads or their spouses); 2) for household members (15 years old and over; excluding middle and high school students); and 3) for children (4th, 5th and 6th grade students).

The household retention rates of the panel survey data were 92.1% (90.5% for individuals) in the second wave, 86.7% (84.3% for individuals) in the third wave, 83.9% (82.3% for individuals) in the fourth wave and 80.25% (78.8 for individuals) in the fifth wave [Table 6.1]

The sample weights were assigned to each panel household based on 1) the size of regions; 2) income between low-income and non low-income households; and 3) post-stratification weights.

6.1.3 Survey Questionnaire

As briefly mentioned above, the survey questionnaires include basic demographic information, health conditions, health care utilisation, economic activities, social insurance membership/benefits, housing information, income, expenditure, assets, debts, living conditions and welfare uptakes. The more specific question domains for the survey are summarized in [Table 6.2].

The survey questionnaires described in [Table 6.2] were the original structure of the first wave and they have been modified in some questions with asterisk in accordance with the changes of welfare services provided, but not meaningful impact on the analysis.

[TABLE 6.2] SUMMARY QUESTION DOMAINS OF THE SURVEY

Classification	Question Domains
I. Households	- General Information - Health and Health Care - Economic Activities - Social Insurance, Pension - Housing - Living Expenditure - Income - Debts, Interests, Subjective Minimum - Assets - Living Condition - Social Security* - Welfare Benefit Uptake - Welfare Services for the Elderly, Children and Disabled and Families*
II. Household Members	- Membership of Social Insurance, Private and Retirement Pensions - Employment - Sense of Living Condition, Life Satisfaction and Social Environment - Life Style, Conjugal Relations and Mental Health - Personal Life Course*
III. Children*	- About School Life, Thoughts and Behaviors, Parents, Friends, and Family

Source: Guide to the Korea Welfare Panel Study (2006, 2010a)

6.1.4 Data Collection

The KOWEPS data was jointly administered by the Korea Institute for Health and Social Affairs and Social Welfare Research Centre within Seoul National University. The data was collected by trained interviewers with face-to-face interviews, as of 31 December each

relevant year. Owing to the face-to-face interview method, missing values of the important variables of interest were kept to a minimum.

6.2 Variables of Interest

This study measures three different dimensions of socioeconomic inequity in diverse types of health care utilisation in South Korea. The inequity measured in this study will be explained by the concept of horizontal inequity (equal treatment for equal need) which requires need standardization with need and non-need variables. Therefore, three groups of variables will be employed for the main empirical analysis: 1) health care utilisation; 2) socioeconomic status; and 3) need and non-need factors.

6.2.1 Health Care Utilisation

The KOWEPS data provides diverse types of health care utilisation which are: 1) total outpatient physician visits; 2) inpatient admissions; 3) inpatient days; 4) general medical checkups; 5) health care expenditures (all inclusive, except insurance premiums); and 6) use of tertiary hospitals.

The recall period of health care utilisation of the sample households was the last 12 months

[TABLE 6.3] VARIABLES 1: HEALTH CARE UTILISATION

Variable	Scale	Note
Outpatient Visits	continuous	- total visits in the last 12 months
Inpatient Admissions	continuous	- total inpatient admission for hospitalization in the last 12 months, including emergency cases
Inpatient Days	continuous	- total hospitalization days in the last 12 months
Medical Examinations	continuous	- total number of taking examinations in the last 12 months
Health Care Expenditures	continuous / 1,000,000 KRW	- total health care expenditure in the last 12 months, excluding public or private health insurance premiums - total amount was divided by the number of household members
Tertiary Hospital Visits	categorical/ level of institution	- choose one mainly utilized hospital among: 0) none; 1) tertiary hospital; 2) local hospital; 3) oriental clinic/hospital; 4) public health center; 5) others, in the last 12 months - the answer categories were recoded into: 1) no hospital use; 2) tertiary hospital use; and 3) non-tertiary hospital use → observations answered 'no hospital use' were dropped for this anaysis - dichotomizes the variable (0 = no use of tertiary hospital, 1= use of tertiary hospital)

from the point of data collection. As [Table 6.3] demonstrates, the total numbers of physician visits include all outpatient visits to any levels of health care institutions, due to the absence of a firm gatekeeping system in Korea. The total numbers of inpatient (including emergency cases) admissions and inpatient days indicate the frequency and the length of hospitalization, respectively. General medical examinations are only applicable to check up services for prevention purposes, not for diagnosis induced by disease symptoms. Household health care expenditures, which are all inclusive[65], are divided into the individual level (total household health care expenditures/number of household members) to compute individual health care expenditures. However, social or private health insurance premiums are excluded in the individual health care expenditure. Including the use of tertiary hospitals in the analysis was meaningful due to the high out-of-pocket payment to access the service in Korea. The variable of the use of tertiary hospitals as a mainly utilized medical institution is dichotomized into: 1) 0 = use other institutions than tertiary hospitals as mainly utilized medical institution; and 2) 1 = use tertiary hospitals as mainly utilized medical institutions.

6.2.2   Socioeconomic Status

Based on the previous domestic and international study results, three important socioeconomic factors, which are 1) household income; 2) household wealth; and 3) education attainment, are employed for measuring horizontal equity in the use of health care services in this study (Allin et al., 2009; Choo et al., 2007; Chun et al., 2007; Chun & Kim, 2007).

The KOWEPS data provides disposable household income which was subtracted taxes and social insurance contributions from the total household income (earned income + business income + property income + private/public income transfer) in Korean Won (KRW). [Table 6.4] In order to make the analysis comparable between the disposable incomes with different size and composition of households, the equivalence income scale which divides disposable household income by the square root of household size was applied to this analysis, in accordance with the method of a recent OECD publication (2008). [Table 6.4]

Net household wealth in the KOWEPS is also coded in KRW and expressed from the difference between the total assets (real estates, financial assets, etc.) and the total debts

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[65] Health care expenditure includes co-payments, co-insurance and out-of-pocket payments.

[TABLE 6.4] VARIABLE 2: SOCIOECONOMIC STATUS

Variable	Scale	Note
Equivalised Household Income	continuous (1,000,000 KRW)	- disposable income: earned income + business income + property income + private income transfer + public income transfer - tax - social insurance withholding - rescaled to equivalised household income = $$\text{disposable household income} / \sqrt{\text{house hold size}}$$
Equivalised Household Wealth	Continuous (1,000,000 KRW)	- net wealth: owned house + owned real estate + occupied real estate + financial assets + agricultural machines + agro and livestock products + other assets – loans from banks – private loans – credit card debts – tenancy deposit owed – credit transaction – other debts - rescaled to equivalised household wealth = $$\text{net household wealth} / \sqrt{\text{house hold size}}$$
Education	ordinal/grouped	- 5 education attainment levels: 1) no education at all; 2) elementary school; 3) middle school; 4) high school; and 5) 2-year junior college and more

(loans from banks, private loans, credit card debts, tenancy deposits, etc.). The net household wealth was also rescaled in the same way with the household income as explained in the Handbook of Economics of Inequality (Salverda et al., 2009). [Table 6.4]

Unlike the previous two socioeconomic variables, the education variable was collected as grouped data. In order to compute concentration indices (or HI*wv* indices) with a grouped variable, a corrected method was applied suggested by Chen and Roy (2009), as explained in the later part of this chapter. The original values of the education variable are: 1) 1 = no official education; 2) 2 = elementary school education (6 years); 3) middle school education (9 years); 4) high school education (12 years); 5) junior college education (14 years), 6) 4-year college education (16 years); and 7) graduate school education (18 years and more) as [Table 6.4] indicates. In 2008, the total number of education level became eight, as a doctoral level was subdivided from the graduate school education group. However, the education variable in this study is regrouped into five groups to: 1) make the education levels equivalent to the quintile groups of other SES variables; and 2) allow the number of observations for each group to be more evenly distributed, as demonstrated in [Table 6.4]. In order for detecting inequity in relation to the education attainment, the observations only aged over 30 are kept for the entire analysis.

6.2.3 Need and Non-Need Variables

For standardizing need of health care utilisation, 1) need variables- age, gender and health condition (self-assessed health, disease, disability and chronic conditions); and 2) non-need

variables (income, wealth, education, employment status, welfare uptake) were used. In this study, need can be defined as expected health care utilisation to receive based on each individual's demographic and health condition factors proxied by age, gender and various measures of health condition (van Doorslaer et al., 2000). Need is calculated by a regression of health care utilisation on a set of need-proxied variables consist of age, gender, self-assessed health, disease, disability and chronic condition. Any inequity caused by need factors is regarded as fair inequity in health care utilisation. The age and gender variables are captured by an interaction variable consists of 12 dummies to control for the

[TABLE 6.5] VARIABLES 3: NEED AND NON-NEED FACTORS

	Variable	Scale	Note
Need Variables	Age	continuous	- 30 years old and over are included in this analysis - age was captured with 6 dummy variables: 30-39, 40-49, 50-59, 60-69, 70-79 and 80+
	Gender	categorical	- gender was recoded into a dummy variable (0 = male/ 1= female) and used to create an age*gender interaction variable for standardization - new age*gender interaction was represented be 12 dummy variables, namely fage3039, fage4049, fage5059, fage6069, fage7079, fage80plus, mage3039, mage4049, mage5059, mage6069, mage80plus,and the reference group mage7079
	SAH	categorical	- chose one general health condition among: 1) excellent (reference group); 2) good; 3) fair; 4) poor; and 5) bad - recoded into 4 dummy variables
	Disease	categorical	- chose one major disease among 18 disease groups (32 groups in 2008) - dichotomized the variable (0 = no disease, 1 = any disease)
	Disability	categorical	- chose one major disability among 16 disability groups - dichotomized the variable (0 = no disability condition, 1 = any disability condition)
	Chronic Disease	categorical	- chose one chronic condition among 3 chronic stages (medication during less than 3 months, between 3 and 6 months or more than 6 months) - dichotomized the variable (0 = no chronic condition, 1 = with any chronic condition)
Non-Need Variables	Income	continuous	refer to [Table 6.4]
	Wealth	continuous	
	Education	ordinal	- chose one among 7 levels of education attainment (8 levels in 2008): same levels specified in [Table 6.4] - recoded into 6 dummy variables; "college education" is a reference group (7 dummy variable for the data of 2008)
	Welfare Uptake	categorical	- chose one of 4 levels of welfare benefit coverage (income supplement) - dichotomized the variable (0 = no welfare benefit received, 1 = with any welfare benefit received)
	Employment	categorical	- created a permanent/temporary employment status as combining multiple variables on employment types - dichotomized the variable (0 = temporary employment, 1 = permanent employment)

gender effect on each age level. The age variable is defined by 6 levels as '30-39,' '40-49,' '50-59,' '60-69,' '70-79,' and '80 and over,' and the gender variable is also defined as 0 = male and 1 = female [Table 6.5].

The answer categories of self-assessed health are five: 1) excellent (reference group); 2) good; 3) fair; 4) poor; and 5) bad, as demonstrated in [Table 6.5], and dummied for analysis. The second health measure is a current disease status. Among 18 types of common diseases (30 diseases for the 2008 data), each observation selected one major disease and they were recoded the answer into a dichotomized variable (0 = no disease, 1 = any disease). The 30 disease groups in 2008 were also regrouped to 18 groups equivalent to those in 2005. The disability status, the third health measure, has 16 categories and also the original answers were recoded into a dichotomized variable (0 = no disability condition, 1 = any disability condition), as [Table 6.5] shows. Lastly, each observation reported his/her chronic disease condition categorised according to the medication stage indicated in [Table 6.5] and recoded into a dichotomized variable (0 = no chronic condition, 1 = any chronic condition), as well.

Indirect standardization also requires a set of non-need (socioeconomic) variables to calculate 'fairness gap' which is the difference between actual health care utilisation and predicted health care utilisation after removing factors relevant to fair inequity in the use of health care (Fleurbaey & Schokkaert, 2009; O'Donnell et al., 2008a; van Doorslaer & Masseria, 2004). In this analysis, the variables of equivalised household income, equivalised household wealth, education, employment status and welfare uptake are utilized to control for non-need factors. The variables of education, employment status and welfare uptake were recoded into dichotomized variables as indicated in [Table 6.5].

6.3   Method of Statistical Analysis

The statistical analysis of this study consists of three main parts which are: 1) descriptive analysis of the data; 2) horizontal inequity in health care utilisation in 2005 in relation to income, wealth and education; and 3) test of inequity changes of health care utilisation between 2005 and 2008. Each part has proper procedures to obtain meaningful results explained below.

6.3.1 Descriptive Analysis

Prior to each inferential analysis of equity in health care utilisation, the general characteristics of the KOWEPS data used will be described. At first, basic statistics of the variables of interest will be presented, such as the number of observations, means, etc. Second, distributions of need and health care utilisation (actual and need standardized) across socioeconomic quintiles will also be presented at the beginning of each result sections.

6.3.2 Inferential Analysis: Horizontal Inequity Analysis

The concept of horizontal equity is founded on the principle of "equal treatment for equal need (ETEN)," defined by many health economists (Culyer & Wagstaff, 1992; Le Grand, 1987; Mooney, 1983; Wagstaff et al., 1991b; Whitehead, 1991). Horizontal Inequity (HI*wv*) index measures the magnitude of inequity which violates the principle of ETEN with a need-standardization method. Through the need-standardization process, the HI*wv* index catches unfair socioeconomic inequity in health care utilisation.

The HI*wv* index is calculated based on the concentration indices (CIs) with a regression-based need standardization process. First, with simple OLS regression models, actual utilisation, need-predicted utilisation and need-standardized utilisation are obtained. Second, concentration indices (CIs) for actual utilisation and need-predicted utilisation are computed based on a convenient regression method. Third, the HI*wv* index (unfair inequity) is calculated by subtracting the CI*f* (fair inequity) from the CI*t* (total socioeconomic inequity), using a fractional rank variable of socioeconomic status. However, the HI*wv* indices for education-related inequity in health care are calculated by a corrected CI method due to its grouped data characteristics.

The magnitudes of inequity in health care by diverse utilisation types are visualized by concentration curves. Both descriptive and empirical analyses for this study were conducted by STATA 12.0.

6.3.2.1 Need-Standardization of Health Care Utilisation
6.3.2.1.1 Actual Utilisation of Health Care

Using a simple OLS regression model, actual health care utilisation by income quintiles can be produced as [Equation 1].

$$[\text{Eq. 1}] \qquad y_i = \alpha + \beta x_i + \sum_k \gamma_k h_{k,i} + \sum_p \delta_p z_{p,i} + \varepsilon_i$$

where y_i indicates the dependent variable representing actual heath care utilisation of individual i in a given period: x_i is socioeconomic dimension of interest of individual i, h_k is a set of k need variables (age, gender, self-assessed health, disability, disease, chronic condition), and z_p also is a set of p non-need variables (equivalised disposable household income, equivalised household wealth, education, welfare uptake and employment status)[66]. α, β, γ_k and δ_p, are coefficients and ε_i is an error term of the equation. The actual utilisation of health care of individuals, y_i, is used to calculate the CI of the total socioeconomic inequity of health care utilisation with a convenient regression method.

6.3.2.1.2   Need-Predicted Utilisation of Health Care

Need-predicted utilisation of individual i can be computed based on [Equation 1] above, with 1) actual values of need variables (h_k) and 2) sample mean values of equivalised household income ($\bar{x}$) and non-need variables ($\bar{z}_p$), as expressed in [Equation 2]:

$$[\text{Eq. 2}] \qquad \hat{y}_i^H = \hat{\alpha} + \hat{\beta}\bar{x} + \sum_k \hat{\gamma}_k y_{k,i} + \sum_p \hat{\delta}_p \bar{z}_p$$

where $\hat{y}_i^H$ indicates expected (need-predicted) health care utilisation of individual i in a given period, reflecting each individual's need characteristics after controlling for non-need variables ($\bar{z}_p$). In other words, $\hat{y}_i^H$ shows predicted health care utilisation on the assumption that the individual i has received the same treatment like others who have the same health care need. This is called fair inequality in health care utilisation derived from differences from age, gender and health status (Fleurbaey & Schokkaert, 2009).

6.3.2.1.3   Indirectly-Standardized Utilisation of Health Care

Indirectly standardized health care utilisation signifies unfair inequality caused by socioeconomic factors which are believed to be avoided by proper policy arrangements. It can be computed by: 1) subtracting need-expected health care utilisation from actual health care utilisation; and 2) adding the sample mean of actual health care utilisation, like [Equation 3]:

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[66] Equivalised household income of individual i ($\dot{n}$ c_i) is replaced to equivalised household wealth (we_i) for measuring wealth-related inequity in health care utilisation.

[Eq. 3] $\qquad \hat{y}_i^{IS} = y_i - \hat{y}_i^H + \bar{y}$

where $\hat{y}_i^{IS}$ denotes indirectly standardized health care utilisation of individual i: $\hat{y}_i^H$ is need-predicted health care utilisation and $\bar{y}$ is the sample mean value of actual health care utilisation. The concentration index obtained by indirectly standardized health care utilisation ($\hat{y}_i^H$) is ended in Horizontal Inequity (HI*wv*) index measuring the direction and the magnitude of inequity in health care utilisation due to socioeconomic (unfair) factors.

6.3.2.2 Horizontal Inequity (HIwv) Index with a Linear OLS Model
6.3.2.2.1 Concentration Index (CI) and Fractional Rank

As explained in the earlier chapter, basically, HI*wv* index is computed in the same way of getting CI. The CI is obtained based on the relationship between the health care variable and the fractional rank variable of socioeconomic status using a simple 'convenient covariance' formula like [Equation 4]:

[Eq. 4] $\qquad C = \dfrac{2}{\mu} \text{cov}(y, r)$

where C indicates CI applied with sample weights in the computation of the mean (μ), the covariance (*cov*), health care utilisation (y) and the rank variable (r). The fractional rank is defined as [Equation 5]:

[Eq. 5] $\qquad r_i = \displaystyle\sum_{j=0}^{i-1} \omega_j + \dfrac{\omega_i}{2}, \qquad \omega_0 = 0$

where ω_i denotes the sample weight of the *i*th individual: the sum of ω_i equals to 1 (observations of socioeconomic variable are sorting in ascending order) and $\omega_0 = 0$.

With a convenient regression method suggested Kakwani, et al. (1997) and Wagstaff & van Doorslaer (2000a), the concentration index of actual utilisation (total inequity) accompanied with the standard error and the confidence interval can be computed as [Equation 6]:

[Eq. 6] $\qquad 2\sigma_r^2 \left(\dfrac{y_i}{\mu} \right) = \alpha + \beta r_i + \varepsilon_i$

where σ_r^2 denotes the variance of r_i (the fractional rank variable): y_i is actual health care utilisation of individual i, μ is the weighted mean value of actual health care utilisation, and

β is an estimate of the concentration index of the total SES-related inequity in health care utilisation (CIt) which is equivalent to C gained from [Equation 4].

When y_i is replace with $\hat{y}_i^H$ (need-predicted utilisation) as expressed in [Equation 7], the concentration index yields fair inequality in health care utilisation:

[Eq. 7] $2\sigma_r^2 \left(\dfrac{\hat{y}_i^H}{\mu} \right) = \alpha_1 + \beta_1 r_i + \varepsilon_i$

where β_1 indicates the concentration index of fair inequity in health care (CIf).

6.3.2.2.2   Horizontal Inequity (HIwv) Index and Confidence Interval

Horizontal Inequity (HIwv) index obtained by an indirect standardization method indicates unfair inequity of health care utilisation and the index is computed as subtracting the fair inequity from the total inequity like [Equation 8]:

[Eq. 8] $2\sigma_r^2 \left(\dfrac{\hat{y}_i^{IS}}{\mu} \right) = \alpha_2 + \beta_2 r_i + \varepsilon_i$

where β_2 indicates the HIwv index (Wagstaff & van Doorslaer, 2000a) which is the gap between the total inequity and fair inequity in health care utilisation and also be expressed as below:

[Eq. 9]   HI$wv = \beta_2 = \beta - \beta_1$

As explained in the earlier chapter, HIwv index ranges (-2, 2) indicating pro-advantaged (pro-disadvantaged) inequity with positive (negative) values.

The convenient regressions of the concentration indices, demonstrated in [Equation 6, 7, & 8], automatically generate standard errors and 95% confidence intervals which enable to test for differences between concentration indices (O'Donnell et al., 2008a; van Doorslaer & Masseria, 2004). Therefore, this study uses the convenient regression method in computing concentration indices, instead of using the simple convenient covariance method presented in [Equation 4].

As explained in Chapter 2, for analysis for probabilities of health care utilisation in the form of binary variables, the method of corrected Erreygers concentration indices (EI) is used (see pp. 11).

6.3.2.3 Horizontal Inequity (HIwv) Index with a Grouped Data Approach

Assigning fractional ranks to observations of a socioeconomic variable is critical in computing CIs. Unlike continuous variables, variables with categorical characteristics contain same values and this may result in unstable and inconsistent CI estimates (Chen & Roy, 2009). To handle this problem, Kakwani et al. (1997) suggested a corrected CI method ([Equation 11]) from their original CI method for micro individual level data ([Equation 10]) as below:

$$[Eq. 10] \qquad C = \frac{2}{n\mu} \sum_{i=1}^{n} y_i r_i - 1 - \frac{1}{n}$$

where C is concentration index: y_i is health care utilisation of individual i, r_i is the fractional rank of the ith individual, and μ is the mean of health care utilisation. However, for the corrected CI method, individuals (i) are replaced with groups (t) in the formula like [Equation 11]:

$$[Eq. 11] \qquad C = \frac{2}{n\mu} \sum_{i=1}^{n} f_t \mu_t r_i - 1$$

where μ_t is the mean of health care utilisation of the tth group and f_t is the population share of the tth group. r_i is also the fractional rank of socioeconomic variable defined as [Equation 12]:

$$[Eq. 12] \qquad r_t = \sum_{t=1}^{t-1} f_t + \frac{f_t}{2}$$

where r_t denotes "the cumulative proportion of the population up to the midpoint of each group interval" (Castano et al., 2002; Kakwani et al., 1997).

And the variance of the estimators of C is computed as below [Equation 13]:

$$[Eq. 13] \qquad var(\hat{C}) = \frac{1}{n}[\sum_{t=1}^{T} f_t a_t^2 - (1 + C)^2] + \sum_{t=1}^{T} f_t \sigma_t^2 (2R_t - 1 - C)^2$$

where n denotes the sample size, σ_t^2 is the variance of health care utilisation (y) in the tth group and μ is the mean of health care utilisation among group t. Although the grouped data approach suggested by Kakwani et al. above (Eq. 13) produces a correct CIs as modifying the fractional rank, the estimates of standard errors do not appropriately calculated due to the serial correlation caused by the ranking variable (Chen & Roy, 2009;

Kakwani et al., 1997). Therefore, Chen & Roy (2009) attempted to resolve this problem establishing an interval bounded by "the upper boundary and lower boundary of CI estimates associated with different sorting mechanism" (p.173) that is also proven to calculate a correct estimates of standard error as shown in [Equation 14]:

[Eq. 14] $\quad \text{var}(\hat{C}) = \frac{1}{n}[\sum_{t=1}^{T} f_t a_t^2 - (1 + C)^2] + \sum_{t=1}^{T} f_t \frac{1}{n_t} \sum_i^{n_t} (y_i^t - \mu_t)^2 (2R_t - 1 - C)^2$

From [Equation 13], σ_t^2 is replace with $\frac{1}{n_t} \sum_i^{n_t} (y_i^t - \mu_t)^2$, where y_i^t denotes the ith observation of the tth group:, n_t is the number of observations in the tth group and μ_t is the mean of health care utilisation in the tth group, as well.[67]

6.3.3   Inferential Analysis: Test of Inequity Changes

In order for testing inequity changes in health care utilisation in Korea between 2005 and 2008, which is the second part of the empirical analyses for this study, another approach using a simple regression method is employed, together with comparing confidence intervals among the HI*wv* indices from the diverse types of health care utilisation (Wagstaff et al., 2000).

The approach is a regression-based test of inequity in health care utilisation suggested by Wagstaff & van Doorslaer (2000a), and can be written as one simple regression formula combined from two different formulae for rich and poor income groups as below:

[Eq. 15] $\qquad y_i = \begin{cases} \alpha_r + \beta_r h_i + \varepsilon_{ri} \dots \dots \dots \dots \dots f \; \dot{r c} \; h \\ \alpha_p + \beta_p h_i + \varepsilon_{pi} \dots \dots \dots \dots \dots f \; \; poor \end{cases}$

where y_i is health care utilisation of the ith individual; h_i is a need (or health) variable that has dichotomized values (0 = not sick, 1 = sick) and ε_i's is error terms. The coefficients of α's for both formulae indicate health care utilisation of the 'not sick' individual i received and the coefficients of α's + β's denote health care utilisation of the sick individual i. If $\alpha_r = \alpha_p$, the individuals without health care need for both groups have received the same health care irrespective of their income. Also, if $\alpha_r + \beta_r = \alpha_p + \beta_p$, theoretically, the individuals with health care need have been given the same level of treatment whether they are rich or poor.

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[67] In STATA version 12, CI and standard error of a grouped socioeconomic variable can be calculated easily with a command "concindc."

The two different regression models can be combined into one simple regression model with a pooled data, including an interaction term of income and need variable ($h_i x_i$) to clarify the contribution of income in equal treatment for equal need, as [Equation 16]:

[Eq. 16] $y_i = \gamma_0 + \gamma_1 h_i + \gamma_2 x_i + \gamma_3 h_i x_i + \varepsilon_i$

where h_i means a need variable of the ith individual and x_i is income of individual i. If $\gamma_2 = \gamma_3 = 0$, it can be interpreted that there is no inequity in health care utilisation in relation to income. It is noteworthy that this equation excludes non-need factors because it only tests equal treatment for equal need across different income (wealth and education) groups (Wagstaff et al., 2000).

The [Equation 16] can also be extended to other socioeconomic related inequity test such as region, wealth and education, and to variables with other characteristics beyond dichotomized variables. As a result, an adapted formula [Equation 17] for this study, inserting a 'year' dummy variable to examine inequity changes between the two years is devised, as below:

[Eq. 17] $y_t = \gamma_0 + \gamma_1 h_{kt} + \gamma_2 x_t + \gamma_3 t_t + \gamma_4 x_t t_t + \varepsilon_t$

where y_t is health care utilisation of individual of i in year t; t_i is a dummied year variable of individual i ($0 = 2005$, $1 = 2008$), h_{kt} is a set of k need variables of individual i in year t, x_t is income (wealth or education) of individual i in year t, and γ's are the coefficients. If γ_4 is equal to zero, it can be interpreted that there is no income (wealth or education) related inequity in health care utilisation in either years. The unbalanced panel data of the two years are pooled for this analysis.

Chapter 7: Equity in Health Care Utilisation in 2008

7.1 Introduction

Consistent with previous studies, this study found that health care services covered generously under Korean National Health Insurance (KHNI), such as outpatient visits, inpatient admissions and inpatient days, are utilized in favour of the less advantaged across the three SES groups --income, wealth and education-- in both total number and probability. On the other hand, medical checkups and health care expenditure, which indicate the quality or intensity of utilisation, show pro-advantaged inequity in both total number and probability. Amongst the three SES dimensions, the magnitude of income-related inequity is the largest while that of wealth-related inequity is relatively moderate.

In the first part of this chapter, a descriptive analysis is conducted to show the distribution of important 'need' and 'non-need' variables across the SES groups by each dimension will be displayed. Then, SES-related inequity in health care utilisation will be measured and compared with the Horizontal Inequity (HIwv) indices. As the purposes of this study are to investigate the existence and changes inequity in health care utilization across the three SES dimensions, a decomposition analysis for finding out the contributions of inequity of each inequity dimension was not conducted here.

7.2 Descriptive Statistics

Prior to need standardization of health care utilisation, the distribution of need factors and non-need factors by the three dimensions of socioeconomic status are analysed with the KOWEPS data from 2008. In each case, simple unadjusted bivariate associations are presented, without any adjustment for other need factors.

7.2.1 Distribution of Need Factors

7.2.1.1 Age and Gender

As [Figure 7.1] illustrates, the mean age of the total observations of the data is 55.28 and the mean ages of each (quintile) group across the three SES indicators vary. Based on the distribution of age across income and education groups, the more disadvantaged are older

[FIGURE 7.1] MEAN AGE BY THE THREE DIMENSIONS OF SES GROUPS

total mean age: 55.28

	Most Disadvantaged	2nd Disadvantaged	Middle	2nd Advantaged	Most Advantaged
income-related	59.55	49.52	47.23	46.26	46.29
wealth-related	49.8	48.53	47.98	48.77	52.96
education-related	72.98	62.52	55.57	45.64	41.91
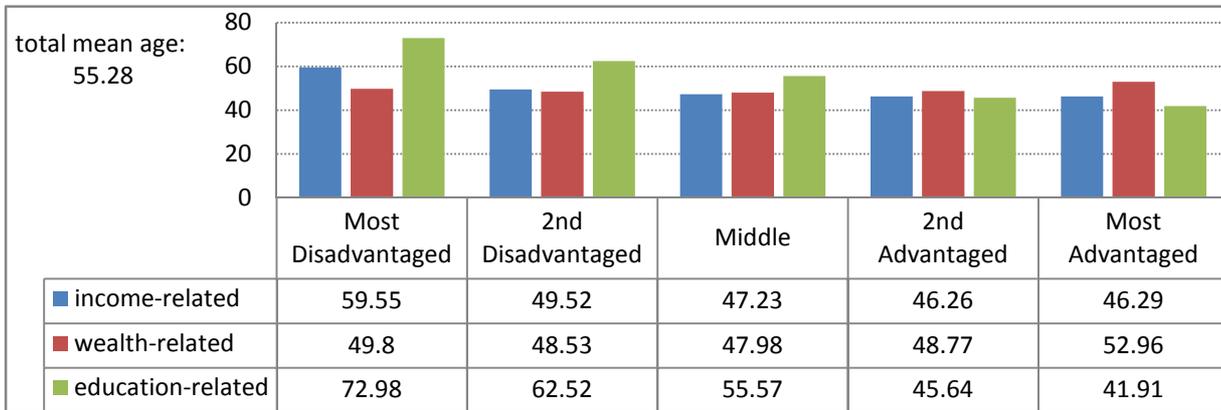
than the advantaged. Particularly, the mean age of least educated group is significantly higher (72.98) than that of the most educated group (41.91) and the distribution of mean age sharply decreases toward the advantaged. On the other hand, the mean age of the wealthiest (52.96) is slightly older than the other wealth quintiles.

Previous studies suggested that the older are more likely to be wealthier than the younger as the wealth has been accumulated over one's lifetime (Allin et al., 2009; Joan, 2008). Also, the "conversion effect" may explain health inequalities among the elderly as 1) increased homogenous health status; 2) mortality selection (relatively healthy elderly were survived at that ages); and 3) intense social safety net for the older ages (Park, 2010). The mean age of the wealthiest quintile is also older than the other groups and the mean ages are relatively equally distributed across the wealth quintiles [Figure 7.1].

Gender is another important indicator of health care utilisation (Merzel, 2000; O'Donnell et al., 2008a). The data used for this study includes 10% more females (54.49%) than males

[FIGURE 7.2] TOTAL GENDER RATIO
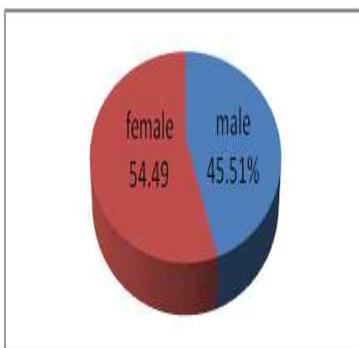
[FIGURE 7.3] GENDER RATIO BY THREE DIMENSIONS OF SES GROUPS

102
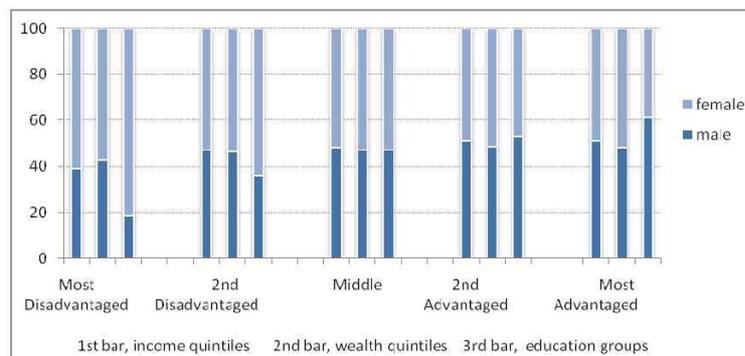
(45.51%) [Figure 7.2]. The gender composition of the dimensions of socioeconomic status shows that the disadvantaged socioeconomic groups have relatively more females than the advantaged groups [Figure 7.3]. In particular, the less educated group consists of far more females (81.73%) than the other education groups. Similar to the distribution of the mean ages across the different dimensions of socioeconomic groups, the gender composition across the wealth quintiles is relatively equal, while the composition across the education groups is much skewed. As [Figure 7.3] demonstrates, the female proportion of the least educated group (81.73%) is four times larger than the male proportion (18.27%). On the contrary to this, the female proportion of the most educated group is considerably lower (38.42%).

7.2.1.2   Health Status

Self-Assessed Health (SAH)

The mean scores of self-assessed health (1 = excellent, 2 = good, 3 = fair, 4 = poor, and 5 = bad) among the income quintile and education groups indicate that the advantaged perceive themselves healthier than the disadvantaged do [Figure 7.4]. The perception gap on self-assessed health across the education groups is wider than the groups of other socioeconomic dimensions. Interestingly, there are no noteworthy differences or trends of the mean scores across the wealth quintiles, but the respondents in the wealthiest quintile group perceive that they are less healthy than the other groups, probably due to their relatively high mean age [Figure 7.1] [Figure 7.4].

[FIGURE 7.4] MEAN SCORES OF SAH BY THREE DIMENSIONS OF SES GROUPS

103
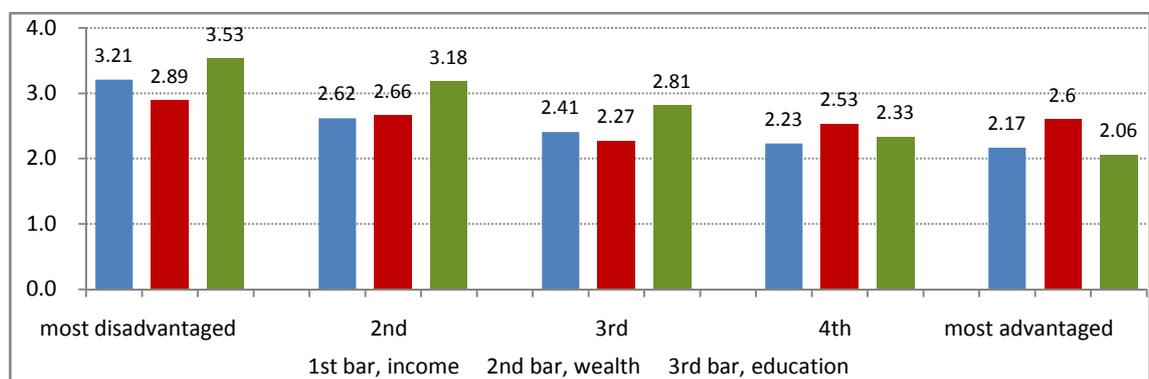
Disease

As [Figure 7.5] shows, the probability of having any disease is the highest in the poorest income quintile group (0.81), the poorest wealth quintile group (0.63) and the least educated group (0.87). The probability of any disease across the wealth quintile groups is relatively evenly distributed, ranged from 0.55 to 0.63, while the probability distribution across the education groups is sharply skewed toward the least educated, ranged from 0.37 to 0.87 [Figure 7.5]. Although taking into account of the severity of each disease into the need standardisation process is meaningful, this study only includes the probability of having any disease because there was lack of information on the magnitude of each individual's disease condition[68].

[FIGURE 7.5] PROBABILITY OF ANY DISEASE THREE DIMENSIONS OF SES GROUPS
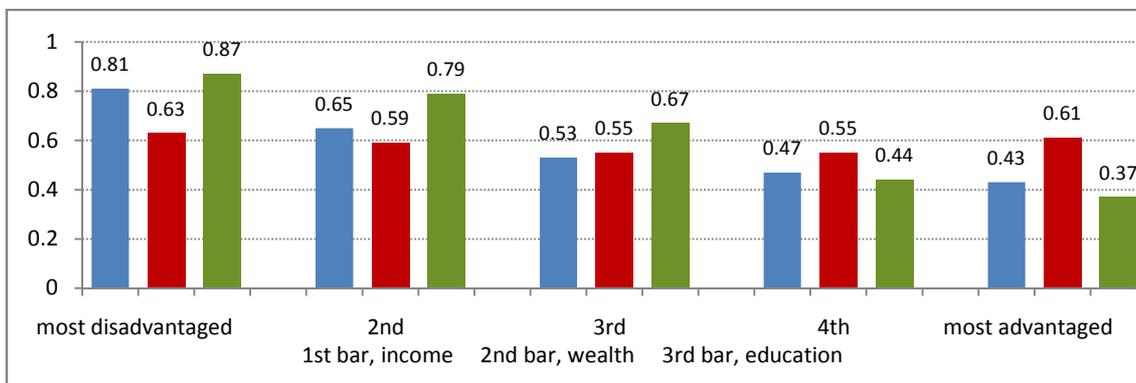
Disability

The distributions of all types of disability are concentrated on the most disadvantaged groups across the three SES dimensions[69]. The probability of having any disability is highly concentrated among the poorest income quintile and it gradually reduces toward the highest income quintile. The pattern of the distribution among the wealth quintiles is similar to that of the income quintiles but less skewed. However, the three lowest education groups have much higher probabilities of having any disability than those of other SES dimensions [Figure 7.6].

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[68] See [Appendix 7] for the distribution of disease by three dimensions of the SES groups.
[69] See [Appendix 8] for the distribution table of disability by three dimensions of the the SES groups.

[FIGURE 7.6] PROBABILITY OF ANY DISABILITY BY THREE DIMENSIONS OF SES GROUPS
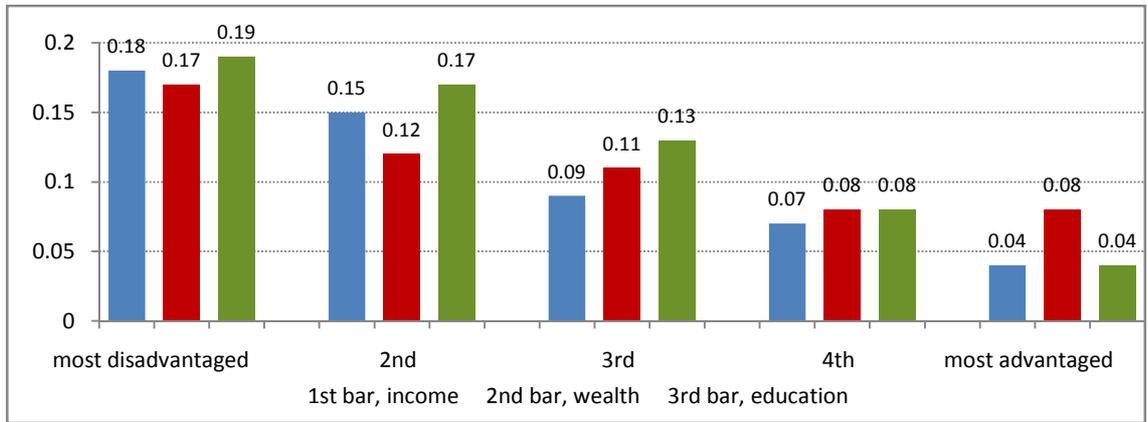
Chronic Conditions

The probability distributions of having any chronic conditions are considerably concentrated among the disadvantaged income and education groups while the probability distribution across the wealth quintile groups is fairly even (0.51 ~ 0.60) [Figure 7.7]. The probability distribution across the education groups is most sharply skewed, ranged from 0.31 to 0.84, and that across the income quintile groups is less skewed toward the poorest income quintile group, ranged from 0.38 to 0.78 [Figure 7.7].

[FIGURE 7.7] PROBABILITY OF ANY CHRONIC CONDITION BY THREE DIMENSIONS OF SES GROUPS
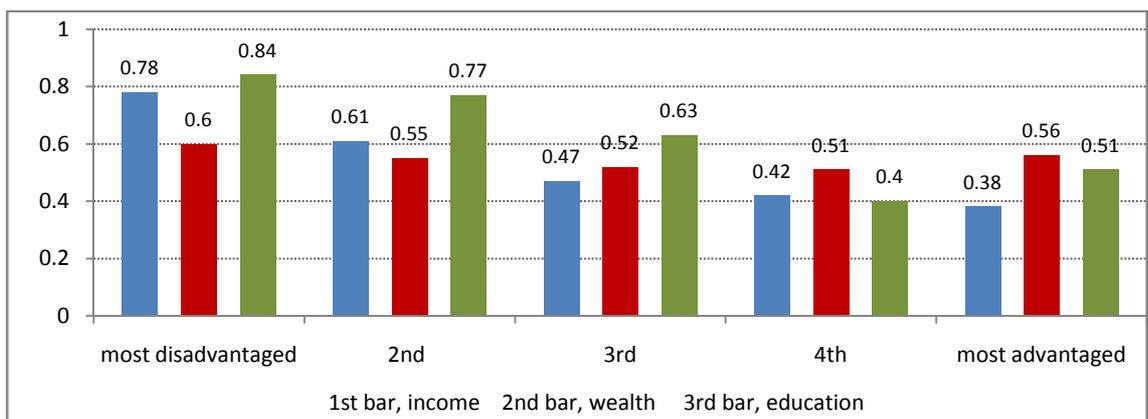
7.2.2   Distribution of Non-Need Factors

7.2.2.1   Income vs. Wealth vs. Education

A number of studies find that there is no perfect relationship between income and wealth (Augustin & Sanga, 2002). While income is a flow concept expressed as a quantity of

financial resources per unit of time, wealth is a stock concept expressed as an accumulation of financial resources at a given point in time (Augustin & Sanga, 2002; Park et al., 2009). Therefore, the level of income and wealth would vary in accordance with age and this may affect health and health care utilisation differently (Park et al., 2009).

As [Figure 8.8] indicates, the relationship between the equivalised household income and the equivalised household wealth is nonlinear and densely populated within the household income 80,000,000 KRW (US$ 66,000, horizontal reference line) and the household wealth 900,000,000 KRW (US$ 750,000, vertical reference line). [Figure 7.9] show the complicated shape of the relationship by age group, showing that both income and wealth are higher among 40's and 50's. Also, while there are a considerable number of wealthy people among the age groups of 60's and over, the overall level of income decreases significantly among 70's and 80's.

The distribution of household income according to the level of education is clearly pro-advantaged, as [Figure 7.10] demonstrates. Although the distribution gradient of household wealth is not gradual with the levels of education attained, the tendency is pro-advantaged, as well.

[FIGURE 7.8] RELATIONSHIP BETWEEN INCOME AND WEALTH

(Unit: 10,000 KRW)
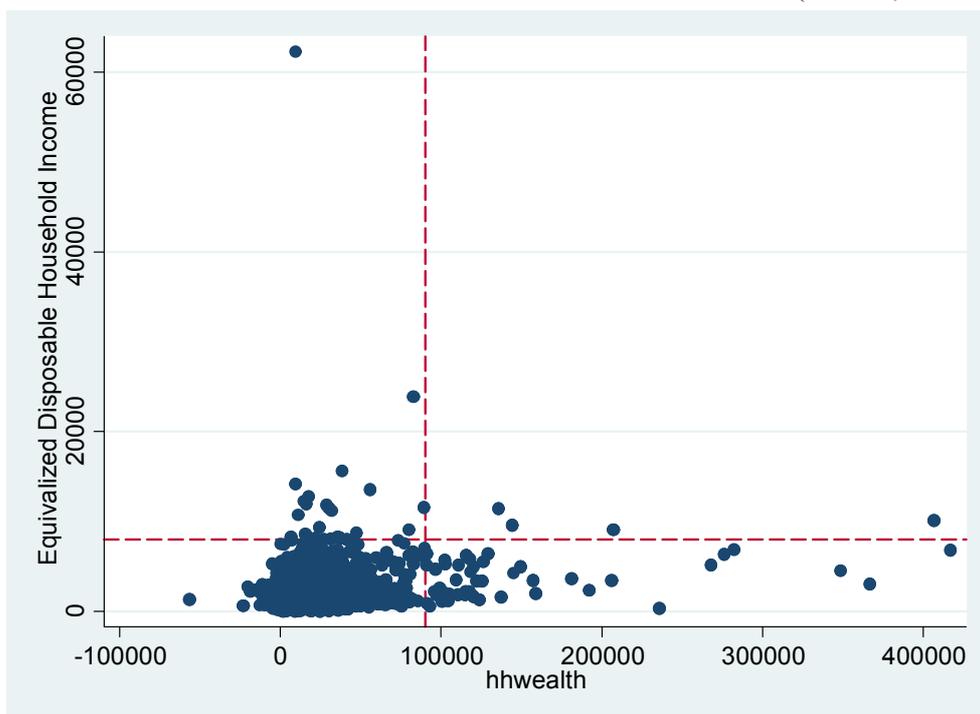
[FIGURE 7.9] RELATIONSHIP BETWEEN INCOME AND WEALTH BY AGE GROUP

(Unit: 10,000 KRW)

30's   40's   50's

60's   70's   80's
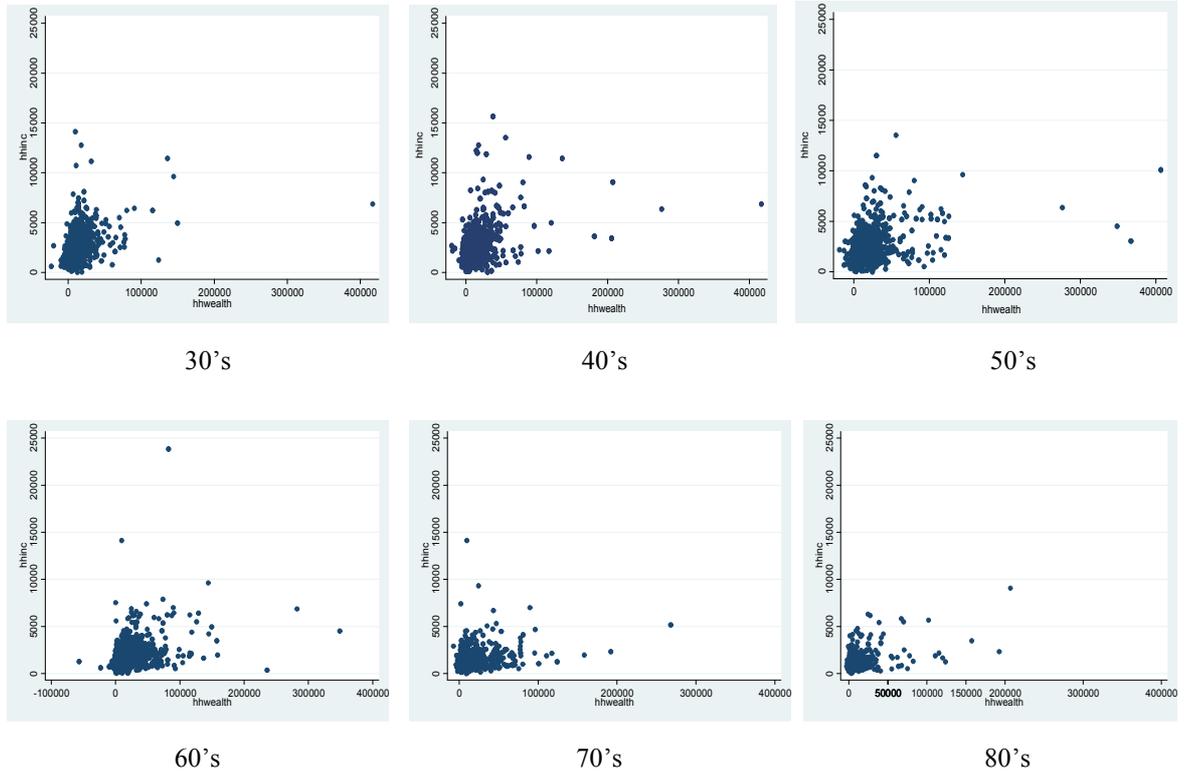
[FIGURE 7.10] MEAN HOUSEHOLD INCOME AND WEALTH BY EDUCATION GROUP

(Unit: 10,000 KRW)
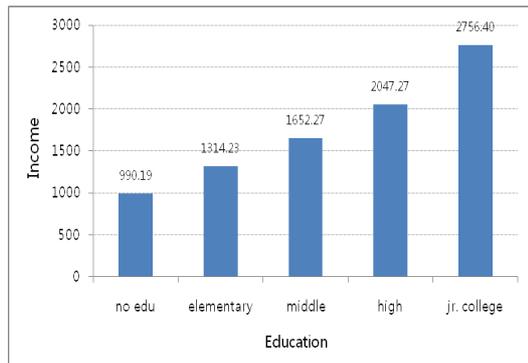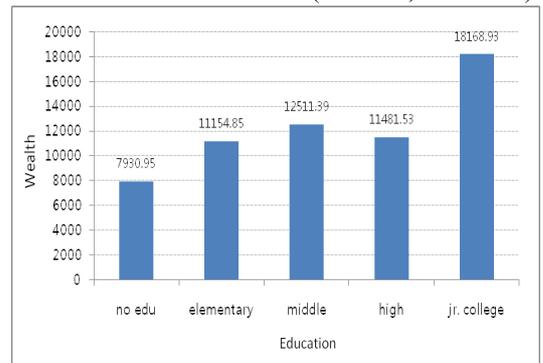
EDUCATION VS. INCOME   EDUCATION VS. WEALTH

7.2.2.2 Employment and Welfare Uptake Status

The data used for this study illustrates that the permanent work position is most strongly associated with the level of education than the other SES dimensions [Figure 7.11]. The probability of having permanent work position is sharply increasing in accordance with the level of education (0.01, 0.04, 0.10, 0.22 and 0.42). The probability of having employment is also higher among the richer, but slightly less steep than those of the education groups.

On the other hand, the probability of having permanent work position is less likely to be associated with the wealth status-- or the probabilities are relatively evenly distributed across the wealth quintile groups-- because the wealthier are more likely to be older with low workability.

The welfare uptake status is strongly associated with all SES dimensions, particuarly with the wealth status, as [Figure 7.12] shows. The probabilities of receiving welfare are highest among the most disadvantaged groups, 0.32 (the poorest wealth quintile), 0.23 (the poorest

[FIGURE 7.11] PROBABILITY OF HAVING PERMANENT WORK POSITION BY THREE DIMENSIONS OF SES GROUP
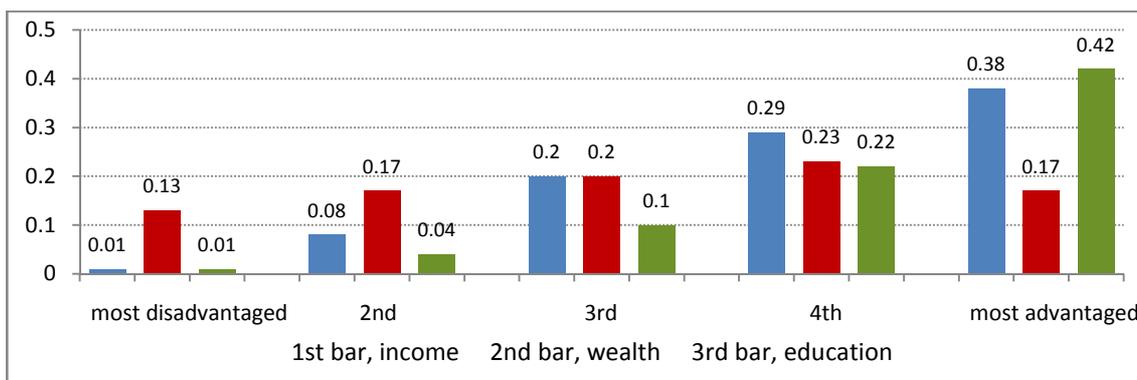
[FIGURE 7.12] PROBABILITY OF WELFARE UPTAKES BY THREE DIMENSIONS OF SES GROUPS
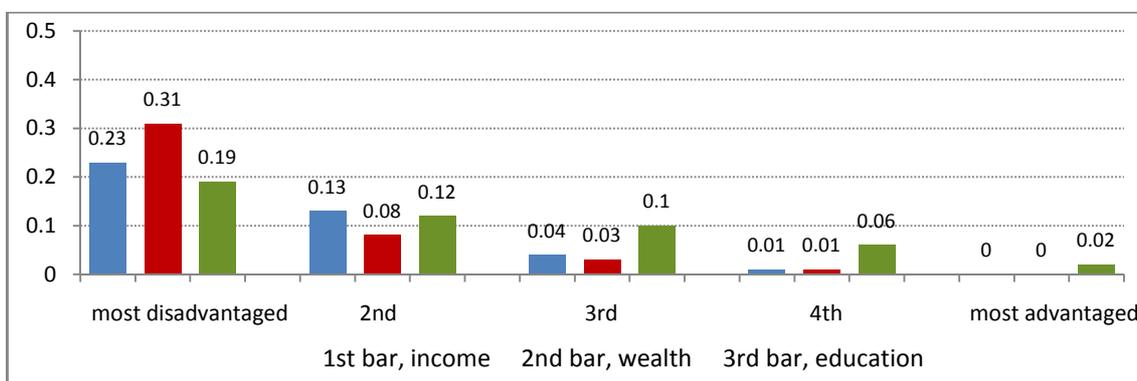
income quintile) and 0.19 (the lowest education group) while there is almost zero probabilities among the most advantaged SES groups.

7.2.3 Summary

The education-related distributions of need factors are heavily concentrated on the less educated groups in terms of age (older), gender (female), SAH, disease, disability and chronic condition. The distribution gap between the most disadvantaged and the most advantaged is the widest for education dimension, compared to income and wealth dimensions. In particular, age is shown to be strongly correlated with the level of education based on [Figure 7.1]. The wealth-related distributions of need factors are relatively even across all quintile groups; rather the need factors are slightly more concentrated on the wealthiest quintile group as their mean age is much older than the mean ages of the less wealthy quintile groups. The income-related distributions of need factors are fairly gradual with a pro-disadvantaged direction.

There is no perfect linear relationship between income and wealth. However, both income and wealth are higher among 40's and 50's while some wealthy people are found among the age groups of 60's and over. Education attainment is positively associated with income and wealth, but more directly proportional to the level of income. Permanent work positions are clearly related with income and education, but less correlated with wealth, while the welfare uptake status is obviously related to all three SES dimensions.

7.3 Income-Related Inequity

7.3.1 Total Number of Health Care Utilisation by Income Quintile Groups

7.3.1.1 Introduction

As explained in the methodology chapter, actual utilisation of health care services by three SES dimensions is adjusted for need factors measured as age, gender, SAH, disease, disability and chronic condition after controlling for non-need factors, such as income, wealth, education, employment status and welfare uptakes in this study, and this is called 'need-predicted health care utilisation.' Need-predicted health care utilisation represents "fair inequality" caused by the health care need factors (Fleurbaey & Schokkaert, 2009; O'Donnell et al., 2008a).

Based on actual and need-predicted health care utilisation, 'indirectly need-standardized health care utilisation[70]' (hereinafter 'need-standardized health care utilisation') is computed, which captures unfair inequality in health care utilisation born of the socioeconomic factors, not of the need factors. This is called the 'fairness gap' approach (Fleurbaey & Schokkaert, 2009). Need-standardized health care utilisation is used for producing concentration curves and their quantified indices (i.e. concentration indices and HIwv indices), measuring SES-related inequity in health care utilisation.

7.3.1.2 Need-Standardization of Health Care Utilisation

Through the need standardization process described in the following section, health care utilized by each income quintile group is adjusted after taking account of health care needs[71]. In general, the health care services which are relatively comprehensively covered by KNHI, such as outpatient visits, inpatient admissions and inpatient days, are utilized much more by the low income quintile groups with higher health care needs, while the health care services after standardizing health care needs are slightly more utilized by the low income groups or almost equally utilized across the income quintile groups. On the other hand, the health care services which are not covered by KNHI or entail high out-of-pocket payments, such as medical checkups and health care expenditure, are utilized in accordance with income level before and after need-standardization, by and large

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[70] Indirect need-standardized health care utilisation = actual utilisation - need-predicted utilisation + mean utilisation

[71] See [Appendix 9] for the table of health care utilisation by income quintiles in total number.

OUTPATIENT VISITS

INPATIENT ADMISSIONS

INPATIENT DAYS

MEDICAL CHECKUPS

HEALTH CARE EXPENDITURE
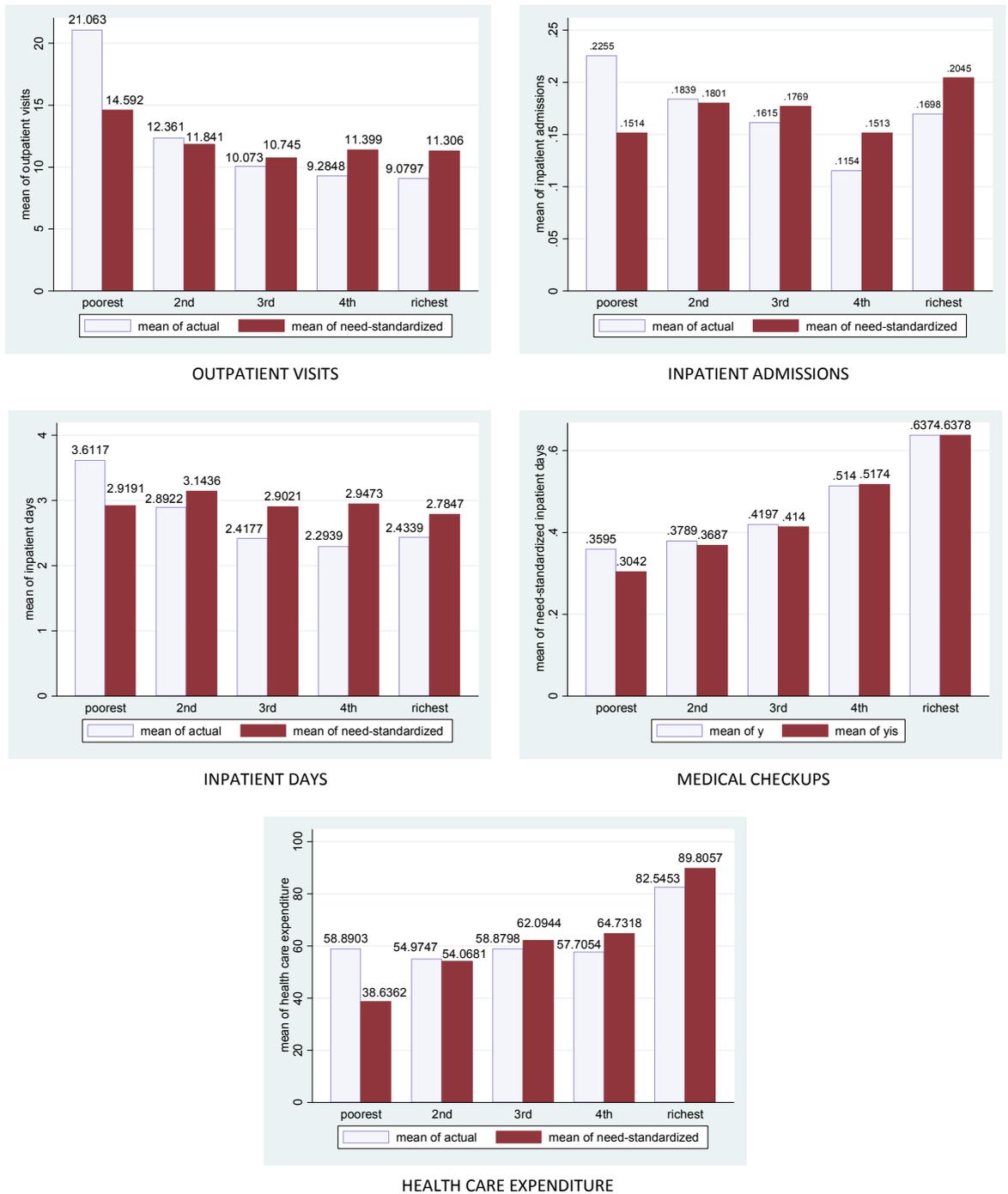
[Figure 7.13]. For medical checkups and healthcare expenditure, need-standardized utilisation is more skewed toward the high income quintile groups compared to actual utilisation [Figure 7.13].

7.3.1.3 Income-related HIwv Indices in Total Number

In the following section, Horizontal Inequity (HI*wv*) indices are used to describe whether there is income-related inequity in health care utilisation. Although the bar graphs-- in the previous section-- are able to illustrate the distribution of the mean health care utilisation by (quintile) group, it is not enough to give a full picture of equal or unequal distribution of health care utilisation and its approximate magnitude across the sections (quintile groups) smoothly with clear graphics (O'Donnell et al., 2008a). Concentration curves are able to demonstrate better pictures of inequity in health care utilisation, graphing the share of health care used by accumulated population ranked from the most disadvantaged to the most advantaged than the bar graphs with group means (Bago d'Uva et al., 2008). If the curve lies above (below) the line of equality which is diagonal, it means that there is pro-poor (pro-rich) inequity in the use of health care. Concentration curves are able to visualize the magnitude and the direction of income-related inequity in health care utilisation across the quintile groups, and also to compare multiple curves with each other. The concentration curves drawn based on the results of this analysis are displayed in Appendix 27. In this section, however, income-related inequity in health care utilisation will be explained by the Horizontal Inequity (HI*wv*) indices [Table 7.1].

- For outpatient visits, the concentration index of actual utilisation in total number is -0.1879, indicating high pro-poor inequity and its HI*wv* index is -0.0480, meaning slight pro-poor inequity in utilisation.

- For inpatient admissions, the concentration index of actual health care utilisation in total number indicates pro-poor inequity (-0.0912), while the need-standardized HI*wv* index is 0.0495, indicating small pro-rich inequity.

- The concentration index of actual inpatient days is -0.1899; but the need-standardized HI*wv* index shows much reduced inequality which is -0.0039. However, the concentration curve of need-standardized inpatient days is jagged across the line of equality [Appendix 27].

- The indices before and after need-standardization of medical checkups indicate high pro-rich inequity as [Table 7.1] displays. The unstandardized concentration index for medical checkups is 0.1413, and the need-standardized HI*wv* is 0.1667 which means slightly larger pro-rich inequality than the index before need-standardization.

[TABLE 7.1] INCOME-RELATED HORIZONTAL INEQUITY (HI) INDICES, TOTAL NUMBER

Utilisation Type	Unstandardized CI	HIwv	Confidence Intervals
Outpatient Visit	-.1879	-.0480	-.0723 ~ -.0236
Inpatient Admissions	-.0912	.0495	-.0165 ~ .1154
Inpatient Days	-.1899	-.0039	-.0685 ~ .0607
Medical Checkups	.1413	.1667	.1480 ~ .1855
Health Care Expenditure	.0852	.1853	.1251 ~ .2455

[FIGURE 7.14] COMPARISON OF INCOME-RELATED HI INDICES OF 2008, TOTAL NUMBER
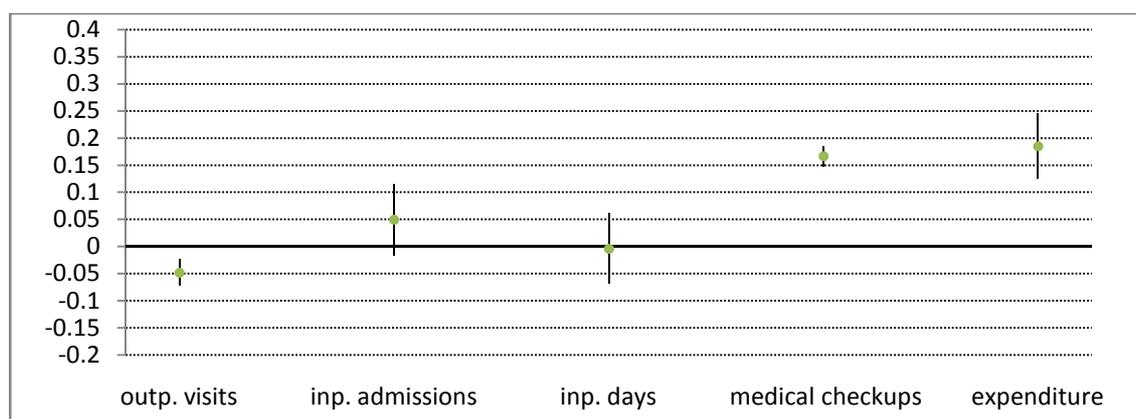
- The concentration index of actual health care expenditure shows slightly pro-rich inequality (CI=0.0852), while that of need-standardized health care expenditure demonstrates more pro-rich inequity (HI*wv* =0.1853).

In summary, as [Figure 7.14] illustrates, there is little or low levels of income-related inequity in the use of outpatient visits, inpatient admissions and inpatient days, while large pro-rich income-related inequity in the use of medical checkups and health care expenditure exits in Korea.

7.3.2 Probability of Health Care Utilisation by Income Quintile Groups

7.3.2.1 Need-standardization of Health Care Utilisation

This section will describe the impact of need-standardization on health care utilisation in probability across the income quintile groups[72]. Compared to the distributions in total number, the probability of actual and need-standardized utilisation for outpatient visits is quite evenly distributed across the income quintile groups. This means that there is a little

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[72] See [Appendix 10] for the table of health care utilisation by income quintiles in probability.

need-standardization impact using outpatient visits in probability. In case of inpatient admissions[73], the distribution of actual health care is more skewed to the lowest income quintile group, while the distribution of need-standardized utilisation is somewhat more concentrated on the middle and the highest income quintile groups [Figure 7.15]. Like the distribution trends in total number, the probability distributions of both actual and need-standardized medical checkups are highly distorted toward the high income quintile groups with little need-standardization impact [Figure 7.15]. In case of probability of tertiary hospital visits, although actual health care is considerably more utilized by the lowest income quintile group with higher health care needs, the distribution of need-standardized utilisation is concentrated on the higher income quintile groups [Figure 7.15].

[FIGURE 7.15] INDIRECTLY NEED-STANDARDIZED HEALTH CARE UTILISATION BY THE INCOME QUINTILES, PROBABILITY

OUTPATIENT VISITS

INPATIENT ADMISSIONS

MEDICAL CHECKUPS

TERTIARY HOSPITAL VISITS

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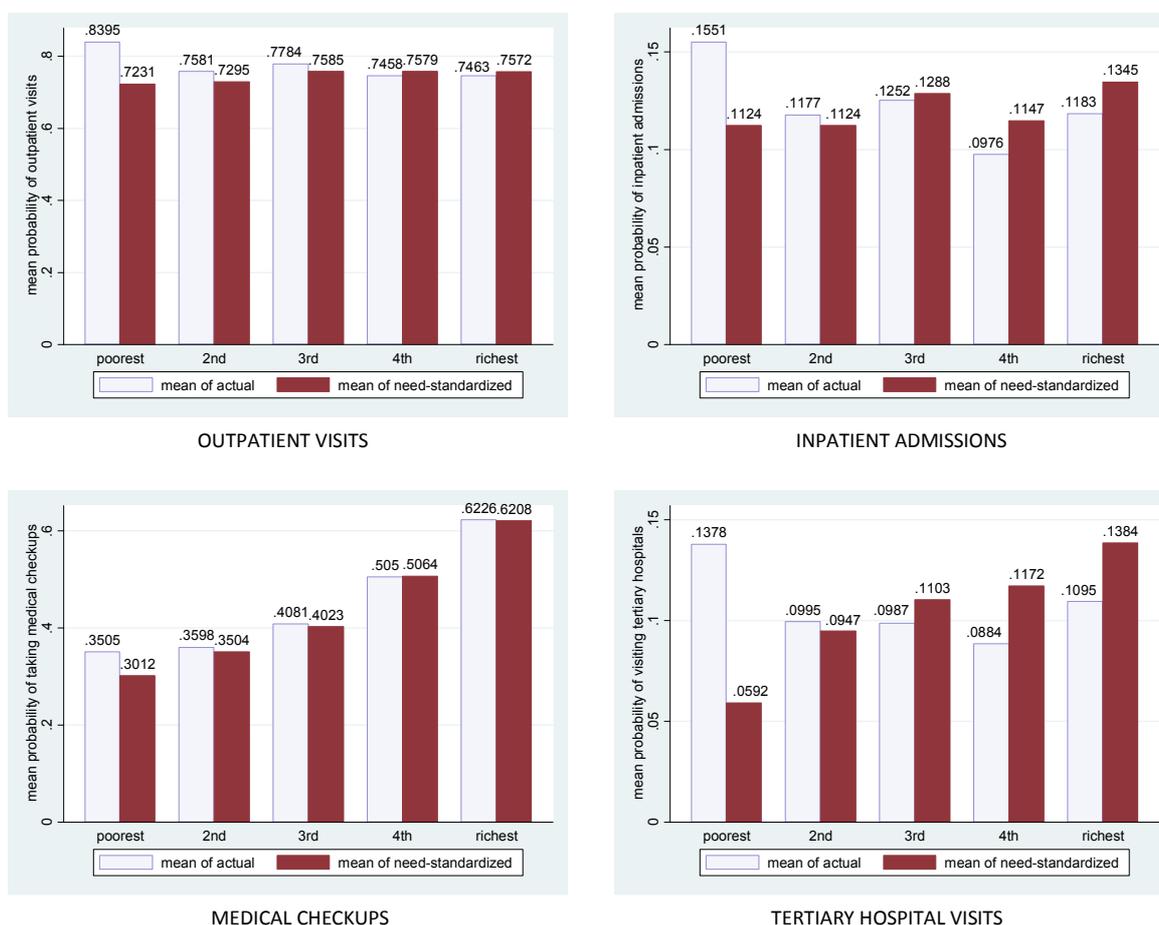
[73] The equity analysis on the use of 'inpatient days' in probability is omitted due to the duplication of the analysis on the use of 'inpatient admissions.'.

In summary, when health care needs are standardized, the uses of outpatient visits and inpatient admissions are more equally distributed across the income quintile groups, while medical checkups and tertiary hospital visits are more utilized by the high income quintile groups [Figure 7.15].

7.3.2.2   Income-related Erreygers Concentration Indices in Probability

Based on need-standardized health care utilisation of probability, income-related inequity is measured with concentration curves and the corrected Erreygers concentration indices (EI) in the following section[74]. The patterns of the EIs of income-related health care in probability by health care services type are almost similar to those in total number, indicating fairly equal or slightly pro-rich opportunities for the use of outpatient visits, inpatient admissions and tertiary hospital visits, but large pro-rich utilisation for medical checkups [Table 7.2] [Figure 7.16].

- To be specific, for outpatient visits, there is little difference in probability between actual and need-standardized utilisation and both curves are very close to the line of equality [Appendix 28], and the EI is 0.0289. It means that people who have the same health care need across the income quintile groups may have almost equal probability to access outpatient care services.

- Although the distribution of actual inpatient admissions is somewhat pro-poor across the income quintile groups, the concentration curve of need-standardized utilisation shows slightly pro-rich inequity, but close to the line of equality. The EI of inpatient admissions is 0.0200, indicating slight pro-rich inequity.

- While the concentration curves of need-standardized utilisation for medical checkups and tertiary hospital visits in probability indicate considerable pro-rich inequity, the directions of both concentration curves of actual utilisation are opposite to each other [Appendix 28]. As [Table 7.2] shows, the probability distribution of need-standardized medical checkups shows very large pro-rich inequality (EI is 0.3022, but the probability distribution of need-standardized tertiary hospital visits is somewhat pro-rich (EI is 0.0581). This means that although the poor have more probability in utilizing tertiary hospitals due to their high health care needs, the rich have more probability in visiting tertiary hospitals after taking

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[74] See [Appendix 28] for the income-related concentration curves for health care utilisation in probability.

[TABLE7.2] INCOME-RELATED HORIZONTAL INEQUITY INDICES (EI), PROBABILITY

Utilisation Type	EI	Confidence Intervals
Outpatient Visits	.0289	.0220 ~ .0357
Inpatient Admissions	.0200	-.0206 ~ .0600
Medical Checkups	.3022	.2847 ~ .3197
Tertiary Hospital Visits	.0581	.0209 ~ .0954

[FIGURE 7.16] COMPARISON OF INCOME-RELATED EIS OF 2008, PROBABILITY
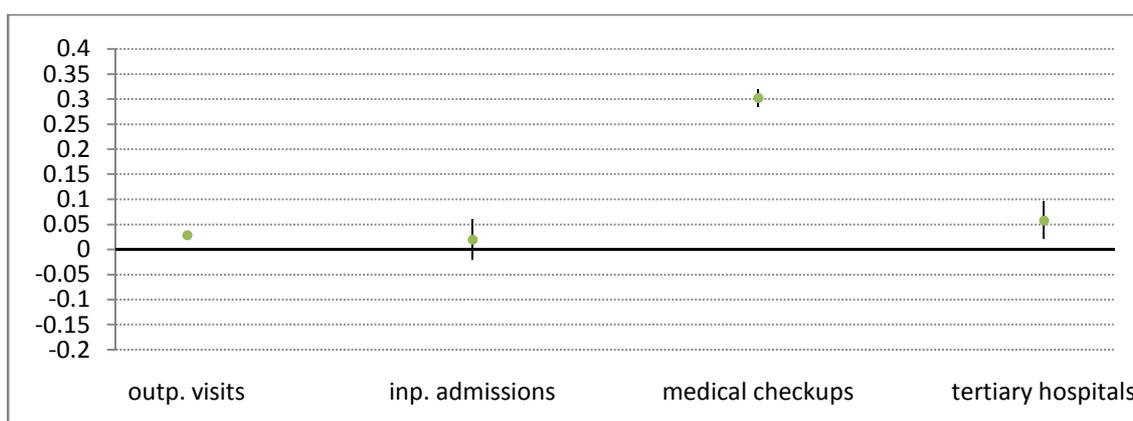
health care need. However, medical checkups-- both before and after need-standardization-- have a strong tendency to be utilized in accordance with the income levels, regardless of health care need.

In summary, similar to the HI*wv* indices in total number, there is little or very low level of income-related inequity in the use of outpatient and inpatient care and tertiary hospital visits in probability, whereas there is considerable pro-rich income-related inequity in the use of medical checkups in probability in Korea [Figure 7.16].

7.4   Wealth-Related Inequity

7.4.1   Total Number of Health Care Utilisation by Wealth Quintile Groups

7.4.1.1   Introduction

As written in the earlier section on descriptive statistics, the distribution patterns of the need factors across the wealth quintile groups are different from that of income quintile groups. The need factors, which include age, gender, SAH and health conditions in this study, are relatively evenly distributed across the wealth quintile groups with somewhat more concentration on the wealthiest quintile group. This can be understood that the aged are more likely to be wealthier and have more health care needs, as well. Therefore, the use of actual health care might be distributed more to the wealthier and this makes the overall distribution across the wealth quintile groups less skewed to the poor than that of the income quintile groups.

7.4.1.2   Need-Standardization of Health Care Utilisation

This section will describe the impact of need-standardization of health care utilisation by wealth quintile groups in comparison with the income dimension[75]. Compared to the income dimension, health care needs and actual health care utilisation in total number across the wealth quintile groups are relatively evenly distributed. In line with this, need-standardized health care for all types of wealth-related utilisation is more evenly distributed than that of income-related utilisation, showing more even distributions of outpatient visits, inpatient admissions and inpatient days, whereas pro-wealthy distributions of medical checkups and health care expenditure [Figure 7.17].

- The distribution of actual outpatient visits in total number is somewhat concentrated on the least wealthy quintile group and the distribution of need-standardized outpatient visits among other wealth quintile groups are quite even.
- In case of inpatient admissions, the distribution of need-standardized utilisation does not show any specific pattern across the wealth quintile groups. The distribution of need-standardized inpatient days is relatively equally distributed across the wealth quintile groups, while actual utilisation is considerably skewed toward the low wealth quintile groups.

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[75]   See [Appendix 11] for the table of health care utilisation by wealth quintiles in total number.

- For medical checkups, the distribution of both actual and need-standardized utilisation is skewed to the wealthiest quintile groups although health care needs are almost equally distributed across the wealth quintile groups[76]. This implies that

[FIGURE 7.17] INDIRECTLY NEED-STANDARDIZED HEALTH CARE UTILISATION BY THE WEALTH QUINTILES, TOTAL NUMBER

OUTPATIENT VISITS

INPATIENT ADMISSIONS

INPATIENT DAYS

MEDICAL CHECKUPS

HEALTH CARE EXPENDITURE

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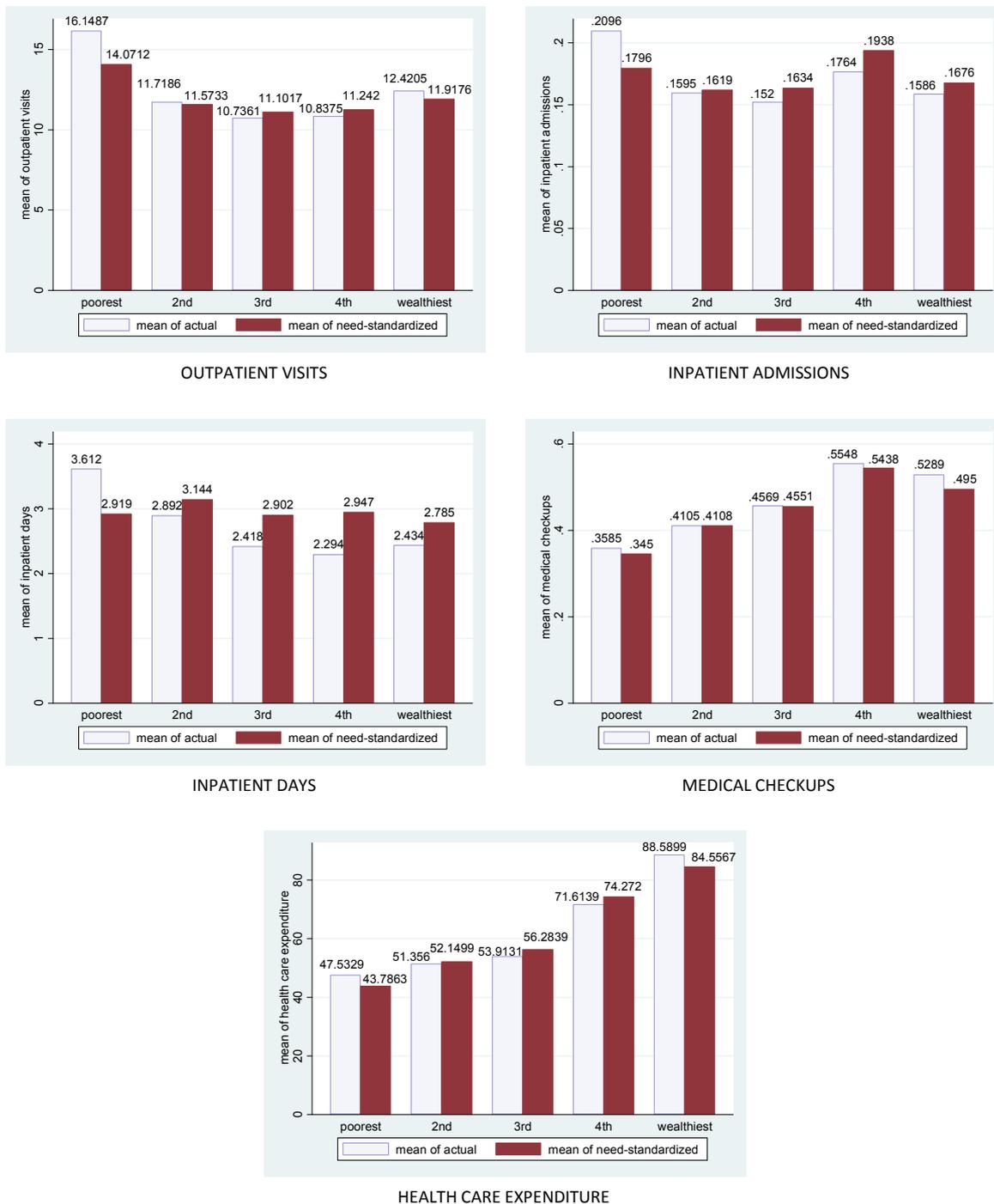
[76] Read the descriptive statistics in the earlier part of this chapter.

medical checkups are more likely to be utilized in accordance with the wealth (SES) status rather than health care needs.

- The distribution of need-standardized health care expenditure is clearly concentrated on the wealthier. Like the case of medical checkups, health care expenditure is tended to be spent according to the wealth status rather than need for health care, as [Figure 7.17] indicates.

7.4.1.3 Wealth-related HIwv Indices in Total Number

This section will present wealth-related inequity in health care utilisation in total number with HI*wv* indices based on need-standardized health care utilisation of wealth quintile groups[77]. As explained earlier, there is a smaller impact of need standardization on wealth-related health care utilisation. The distributions of health care needs and actual utilisation are relatively even than the income-related distributions [Table 7.3] [Figure 7.18].

- For outpatient visits, need-standardized utilisation is slightly pro-poor (HI*wv* index = -0.0378), indicating somewhat higher utilisation by the lower wealth quintile groups after taking health care needs into account.

- For inpatient admissions, actual utilisation in total number shows slight pro-poor inequality (CI = -0.0569) and that for need-standardized utilisation is indented over the line of equality; however, its HIwv index is -0.0043, indicating little inequality in utilisation. The concentration indices of actual and need-standardized inpatient days show similar patterns like those of inpatient admissions; but need-standardized utilisation (HI*wv* index = -0.0116) for inpatient days demonstrates more pro-poor inequality than that of inpatient admissions.

- The concentration indices of actual and need-standardized medical checkups show little difference and this is very similar to the income-related case. The HI*wv* index of the need-standardized medical checkups is 0.0905, indicating considerable pro-wealthy inequity.

- For health care expenditure, the both concentration indices of actual and need-standardized utilisation are considerably pro-wealthy, and the need-standardized index is 0.1606, which is more pro-wealthy inequity than that of medical checkups.

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[77] See [Appendix 29] for the wealth-related concentration curves for health care utilisation in total number.

[TABLE 7.3] WEALTH-RELATED HORIZONTAL INEQUITY (HI) INDICES, TOTAL NUMBER

Utilisation Type	Unstandardized CI	HIwv	Confidence Intervals
Outpatient Visit	-.0643	-.0378	-.0619 ~ -.0137
Inpatient Admission	-.0569	-.0043	-.0562 ~ .0475
Inpatient Days	-.0879	-.0116	-.0738 ~ .0505
Medical Checkups	.1010	.0905	.0703 ~ .1107
Health care Expenditure	.1579	.1606	.1248 ~ .1964

[FIGURE 7.18] COMPARISON OF WEALTH-RELATED HI INDICES OF 2008, TOTAL NUMBER
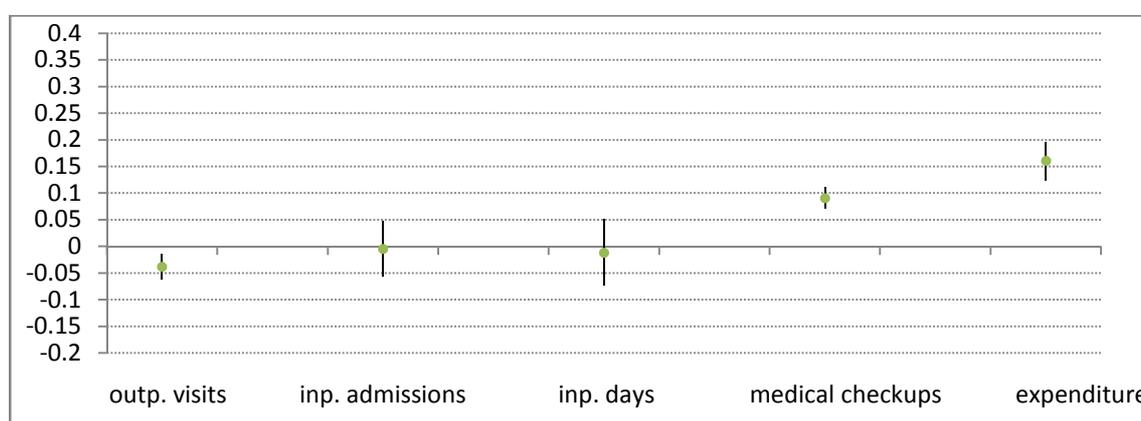
In summary, as [Figure 7.18] compares the wealth-related HI*wv* indices among the different types of health care utilisation, the indices of outpatient visits, inpatient admissions and inpatient days are close to 'the line of zero' (no SES-related inequity in theory). In comparison to the HI*wv* indices of income-related utilisation, the indices of wealth-related utilisation in total number show less inequity. On the other hand, the wealth-related HI*wv* indices of medical checkups and health care expenditure indicate substantial pro-wealthy inequity.

7.4.2 Probability of Health Care Utilisation by Wealth Quintile Groups

7.4.2.1 Need-Standardization of Health Care Utilisation

This section will describe the impact of need-standardization on the probability of wealth-related health care utilisation[78]. As [Figure 7.19] indicates, the probability of both actual

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[78] See [Appendix 12] for the table of health care utilisation by wealth quintiles in probability.

OUTPATIENT VISITS

INPATIENT ADMISSIONS

MEDICAL CHECKUPS

TERTIARY HOSPITAL VISITS
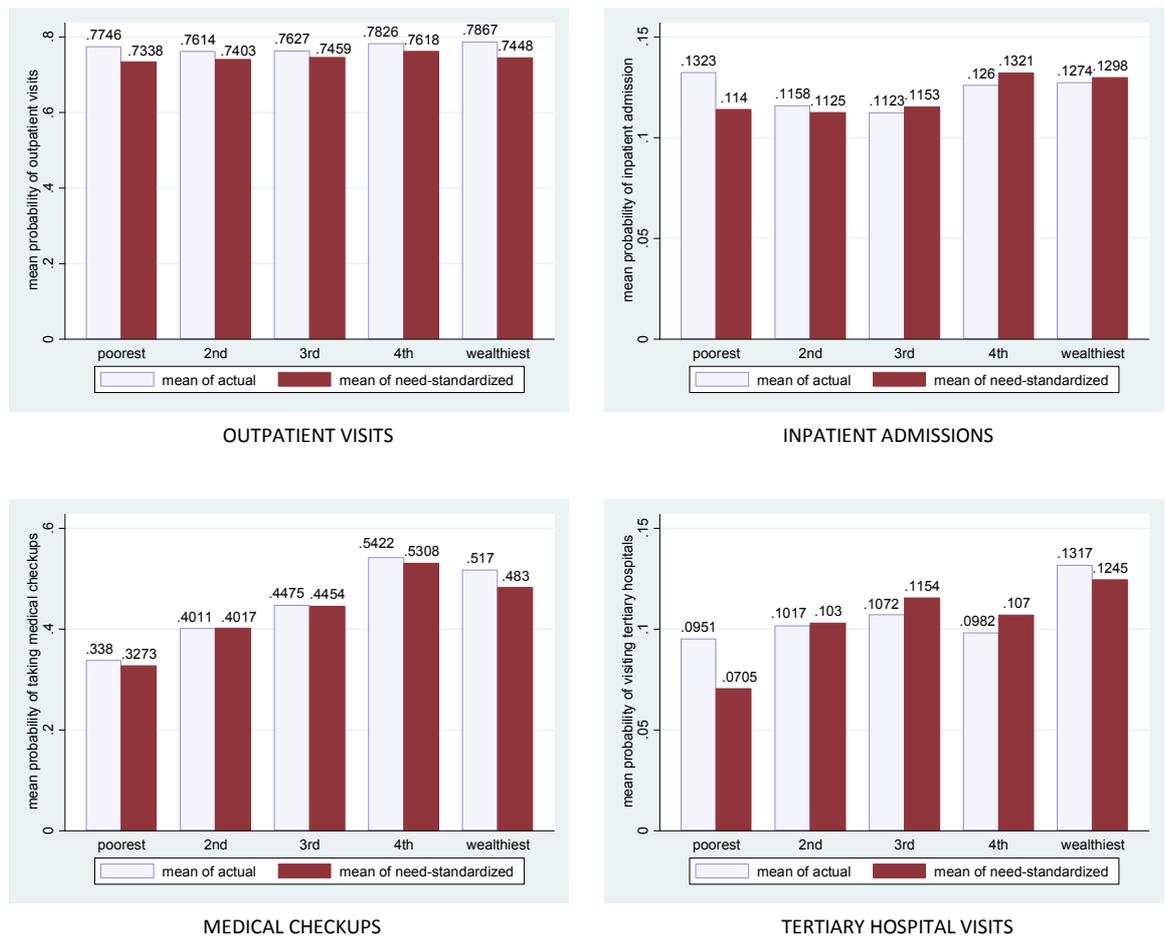
and need-standardized health care utilisation is relatively evenly distributed across the wealth quintile groups, by and large, compared to the total numbers of health care utilisation. The distributions of need-standardized outpatient visits and inpatient admissions are almost equal or very sligtly pro-wealthy, while need-standardized medical checkups and tertiary hospital visits are clearly distributed with a pro-wealthy direction-- although the skeweness is relatively moderate compared to the income dimension.

7.4.2.2   Wealth-related Erreygers Concentration Indices in Probability

This section will demonstrate wealth-related inequity in probability of health care utilisation with EI[79]. As shown in [Figure 7.20], the overall magnitudes of wealth-related inequity in probability of health care utilisation are very small, except medical checkups.

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[79] See [Appendix 30] for the wealth-related concentration curves for health care utilisation in probability.

Compared to the degrees of income-related inequity, those of wealth-related inequity in health care utilisation in probability are quite smaller, as well.

- The EIs for outpatient visits and inpatient admissions in probability are 0.0142 and 0.0158. This means that the people with the same health care needs share almost the equal chances in the use of outpatient and inpatient care services across the wealth quintile groups [Table 7.4].

- Similar to the total number of medical checkups, both concentration indices in probability of medical checkups are very similar to each other. The EI index of medical checkups is 0.1681, indicating considerable pro-wealthy inequity.

- The need-standardized concentration index of the probability of tertiary hospital visits appears slight pro-wealthy inequity (EI = 0.0337) and the magnitude is quite similar to that income-related inequity in probability [Figure 7.20].

[TABLE 7.4] WEALTH-RELATED HORIZONTAL INEQUITY (EI) INDICES, PROBABILITY

Utilisation Type	EI	Confidence Intervals
Outpatient Visits	.0142	.0074 ~ .0211
Inpatient Admissions	.0158	-.0242 ~ .0557
Medical Checkups	.1681	.1523 ~ .1880
Tertiary Hospital Visits	.0337	-.0026 ~ .0700

[FIGURE 7.20] COMPARISON OF WEALTH-RELATED EIS OF 2008, PROBABILITY
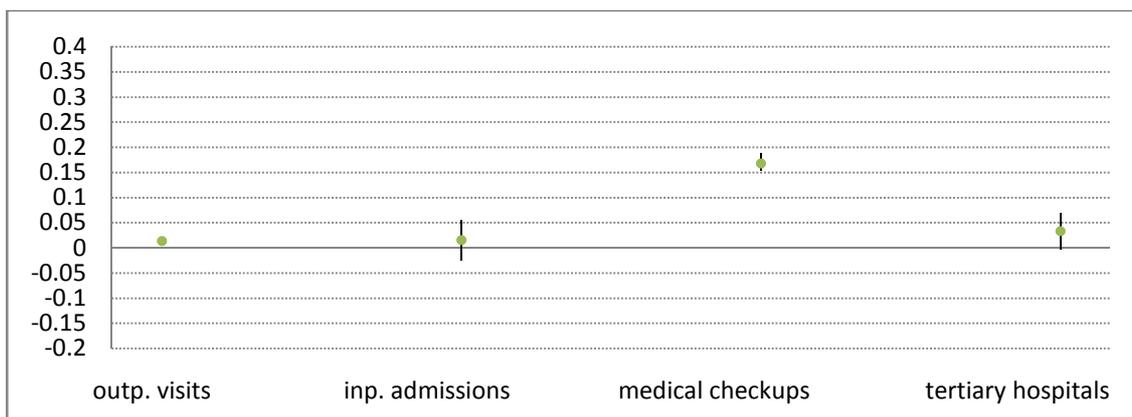
In summary, as [Figure 7.20] displays, there is almost no wealth-related inequity in the use of outpatient visits and inpatient admissions, while the opportunity to use of medical checkups exhibits considerable pro-wealthy inequity. The probability of being admitted to hospitals, like the income-related case, indicates slightly pro-wealthy inequity.

7.5   Education-Related Inequity

7.5.1   Total Number of Health Care Utilisation by Education Groups

7.5.1.1   Introduction

Prior descriptive statistics on the distribution of the need and non-need factors across the different SES groups inform that the education-related distributions have the largest disparities than the income- and wealth-related distributions. As the distribution of health care needs is heavily skewed toward the less educated, all types of health care services are utilized much more by the less educated, compared to the less advantaged groups of two other SES dimensions. However, the distributions of need-standardized utilisation across the education groups appear rather moderate compared to other SES dimensions.

7.5.1.2   Need-Standardization of Health Care Utilisation

This section will describe the changes before and after need-standardization of health care utilisation by education group, as [Figure 7.21] displays [80].

- For outpatient visits, although need-standardized utilisation is more evenly distributed across the education groups than the distribution of actual utilisation, it is somewhat concentrated on the 'no education' and 'elementary school education' groups.

- In case of inpatient admissions, need-standardized utilisation is highly concentrated on the 'elementary school education' group with relatively even distribution among other groups while the actual utilisation is heavily skewed to the 1st (no education) and the 2nd (elementary school education) lowest education groups.

- The distributions of actual and need-standardized inpatient days are similar to those of inpatient admissions. The distribution of need-standardized inpatient days is more concentrated on the 'no education' and 'elementary school education' groups than other education groups, and the overall need-standardized distribution is quite moderate than the distribution of actual distribution.

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[80] See [Appendix 13] for the table of health care utilisation by education group in total number.

OUTPATIENT VISITS

INPATIENT VISITS

INPATIENT DAYS

MEDICAL CHECKUPS

HEALTH CARE EXPENDITURE
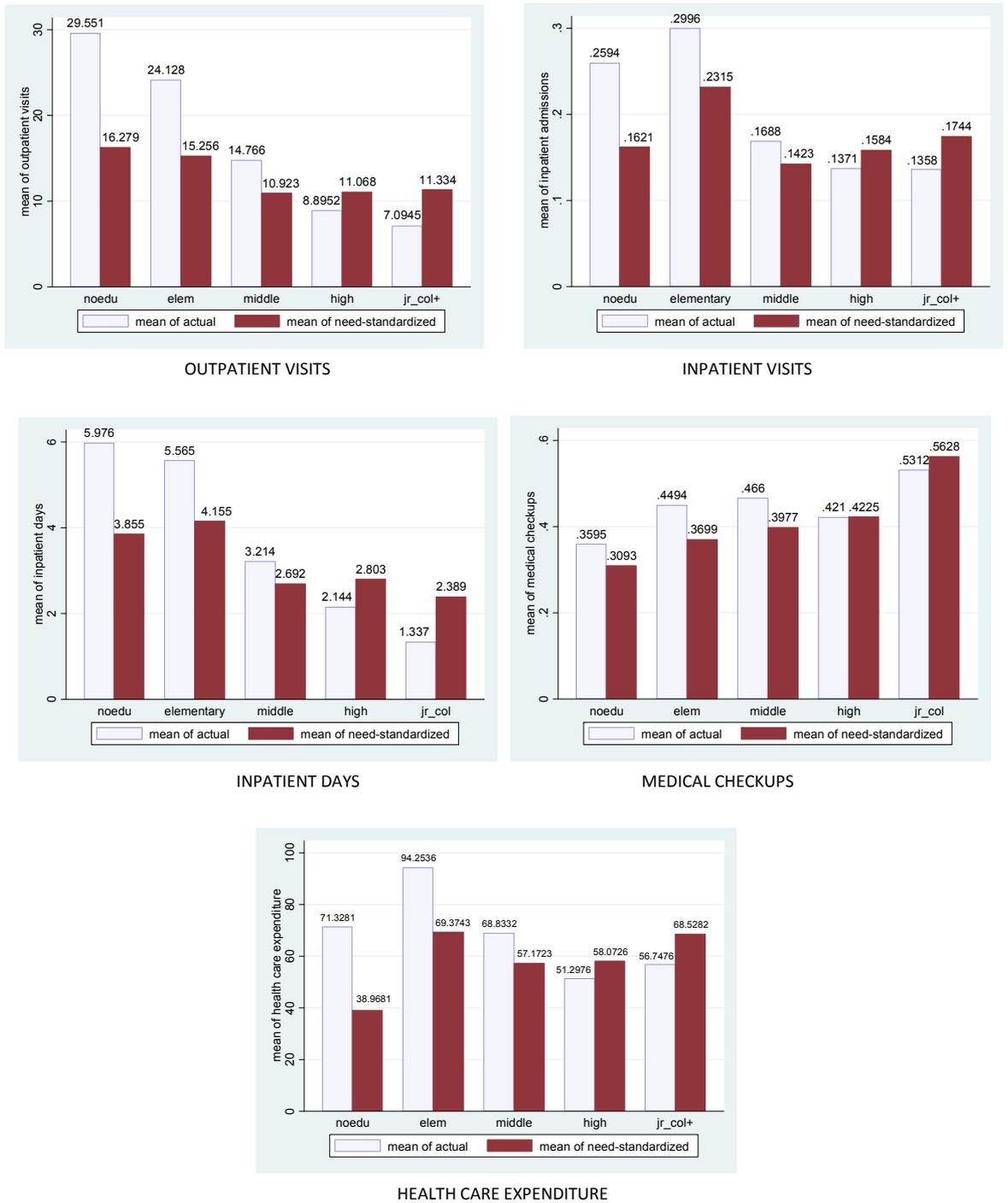
- In case of medical checkups, the distribution of actual health care is slightly more concentrated on the more education groups with higher utilisation means of 'elementary school education,' 'middle school education' and 'junior college and more education' groups and this distribution pattern is different from those of the

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other two SES dimensions which show clear pro-advantaged (pro-rich and pro-wealthy) distribution. However, after considering health care needs, medical checkups are more likely utilized by the more educated groups, as [Figure 7.21] illustrates.

- The distribution of need-standardize health care expenditure does not show any clear pattern. However, the 2nd lowest education group spent health care expenditure the most before and after need-standardization. On the other hand, the least educated group spent least on health care after need-standardization, while they spent 2nd most before standardization. Overall, the more educated slightly more spent on health care after considering their health care need compared to the less educated.

7.5.1.3   Education-related HI*wv* Indices in Total Number

This section will provide education-related inequity in the total number of health care utilisation with HI*wv* indices[81]. The overall trends of education-related inequity in the total numbers of health care utilisation are similar to the other SES dimensions, except for health care expenditure [Table 7.5] [Figure 7.22].

- For outpatient visits, like other SES dimensions, the need-standardized index (HI*wv* = -0.0570) shows slight pro-poor inequity, meaning the less educated utilize a bit more outpatient care if their health care needs are the same as the people across the education groups.

- The distributions of actual inpatient care-- admissions and days-- are considerably pro-disadvantaged; however, the magnitude of pro-disadvantaged utilisation is much reduced after standardizing health care needs. The HI*wv* index of inpatient admissions is -0.0251 and that of inpatient days is -0.0995.

- In case of medical checkups, both concentration indices of actual and need standardized utilisation are pro-educated; however, the magnitude of pro-educated inequity in the use of need-standardized medical checkups is larger than that of actual utilisation (HI*wv* = 0.1158)

- Unlike two other SES dimensions, the concentration index of actual health care expenditure across the education groups show pro-less educated inequity (-0.1191)

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[81] See [Appendix 31] for the education-related concentration curves for health care utilisation in total number.

with a considerable magnitude, while the HI*wv* index (0.0409) indicates slight pro-educated inequity. Based on the HI*wv* indices of health care expenditure among the three SES dimensions, the magnitude of pro-advantaged inequity with the education dimension is the smallest.

In summary, compared to the income and wealth dimensions, the education-related distribution of actual health care utilisation in total number is highly concentrated on the less educated groups across all health care service types, except the distribution of medical checkups [Table 7.5]. After health care needs are standardized, the utilisation of outpatient visits, inpatient admissions and inpatient days indicate much reduced pro-less educated inequity. On the other hands, the use of need-standardized medical checkups and health care expenditure show pro-educated inequity with moderated degrees of inequity-- particularly for health care expenditure--than the other SES dimensions [Figure 7.22].

[TABLE 7.5] EDUCATION-RELATED HORIZONTAL INEQUITY (HI) INDICES, TOTAL NUMBER

Utilisation Type	Unstandardized CI	HIwv	Confidence Intervals
Outpatient Visit	-.2975	-.0570	-.0808 ~ -.0333
Inpatient Admission	-.1832	-.0251	-.1017 ~ .0517
Inpatient Days	-.3000	-.0995	-.1666 ~ -.0323
Medical Checkups	.0541	.1158	.0974 ~ .1343
Health care Expenditure	-.1191	.0409	-.0072 ~ .0890

[FIGURE 7.22] COMPARISON OF EDUCATION-RELATED HI INDICES OF 2008, TOTAL NUMBER
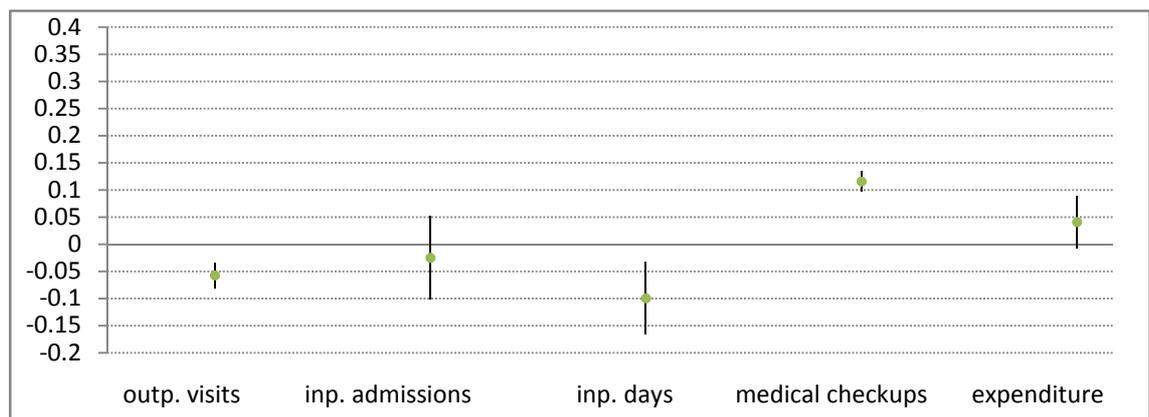
### 7.5.2 Probability of Health Care Utilisation by Education Groups

7.5.2.1 Need-Standardization of Health Care Utilisation

This section will present the changes between actual and need-standardized health care utilisation-- in probability-- the education groups through need-standardization[82] [Figure 7.23].

- The probability distributions of actual outpatient visits and inpatient admissions considerably skewed to the lower education groups, while the probability distributions of need-standardized outpatient visits and inpatient admissions are evenly or slightly more concentrated on the lower education groups.
- On the other hand, need-standardized medical checkups are more likely to be

[FIGURE 7.23] ACTUAL VS. NEED-STANDARDIZED HEALTH CARE UTILISATION BY THE EDUCATION GROUPS, PROBABILITY

OUTPATIENT VISITS

INPATIENT ADMISSIONS

MEDICAL CHECKUPS

TERTIARY HOSPITAL VISITS

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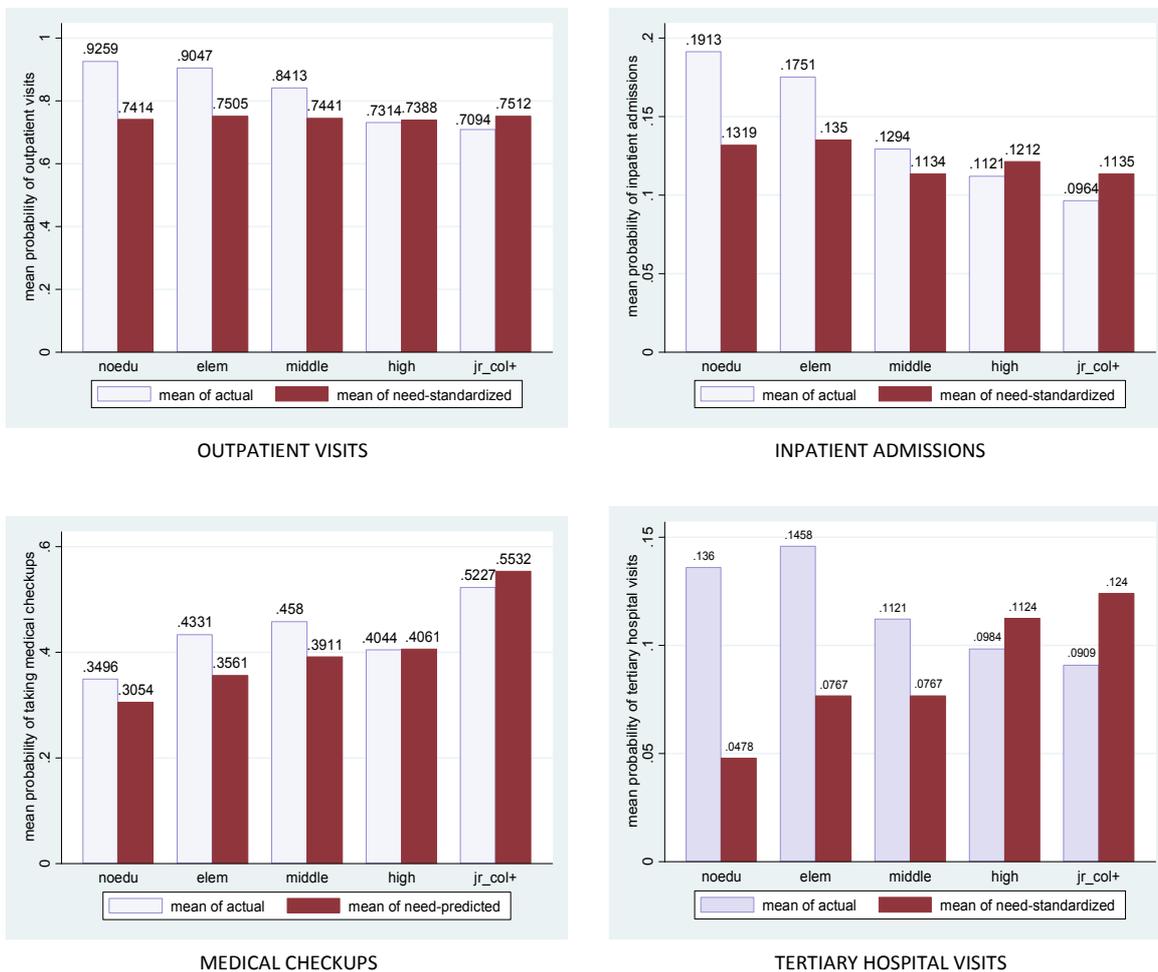
[82] See [Appendix 14] for the table of health care utilisation by education group in probability.

utilized by the more educated groups while actual utilisation shows less concentration on the more educated groups. The pro-educated tendency in the use of need-standardized medical checkups seems significantly weaker than those of the other two SES dimensions.

- However, like the case of income-related utilisation, the probability of need-standardized tertiary hospital visits is higher among the more educated groups, while the distribution of actual utilisation is considerably concentrated on the low educated groups, particularly on the lowest education group and the 2nd lowest education group. It is assumed that although the less educated have higher health care need to induce more visits to tertiary hospitals, the more educated have higher probability to visit tertiary hospitals after standardizing health care needs.

7.5.2.2 Education-related Erreygers Concentration Indices in Probability

This section will show education-related inequity in the probability of health care utilisation with concentration curves and EIs[83] [Table 7.6] [Figure 7.24].

- The EI of need-standardized outpatient visits in probability is close to zero (0.0070), while actual outpatient visits in probability appears somewhat pro-less educated.

- For inpatient admissions, the concentration index of the actual probability indicates considerably large pro-educated inequity, while the index of need-standardized utilisation is very close to zero (EI = -0.0173), indicating much reduced magnitude of pro-poor inequity after considering health care need.

- In case of medical checkups, pro-educated inequity is found for the concentration indices for both actual and need-standardized probability of utilisation, but the magnitude of inequity in need-standardized utilisation is larger (EI = 0.2018) than that of actual utilisation.

- For tertiary hospital visits, the probability of actual utilisation is considerably pro-less educated, while that of need-standardized utilisation is quite pro-educated (EI = 0.1116).

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[83] See [Appendix 32] for the education-related concentration curves for health care utilisation in probability.

Utilisation Type	EI	Confidence Intervals
Outpatient Visits	.0070	.0004 ~ .0135
Inpatient Admissions	-.0173	-.0570 ~ .0224
Medical Checkups	.2018	.1841 ~ .2195
Tertiary Hospital Visits	.0458	.0103 ~ .0813

[FIGURE 7.24] COMPARISON OF EDUCATION-RELATED EIS OF 2008, PROBABILITY
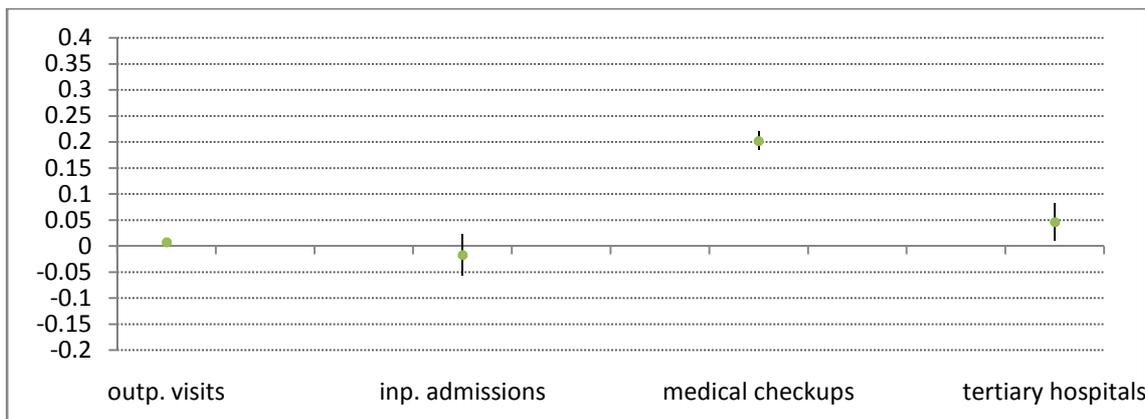
In summary, the probability of actual health care utilisation, except for medical checkups, is higher among the low education groups and the degrees of inequity are relatively larger than those of the other SES dimensions. After standardizing health care needs, the degrees of pro-less educated inequity with the education dimension in the use of outpatient visits, inpatient admissions and tertiary hospital visits are much reduced, while the use of medical checkups shows large degrees of pro-educated inequity [Figure 7.24].

7.6　Summary & Discussions

7.6.1　Summary of Findings

As [Figure 7.25] and [Figure 7.26] show, the major findings of the first empirical chapter on "equity in health care utilisation across the three SES dimensions in 2008" are summarized as below:

After health care needs are standardized,

- *outpatient visits in total number indicate pro-disadvantaged inequity across all three SES dimensions while little SES-related inequity is found in probability*

- *there is pro-advantaged income-related inequity in the use of inpatient admissions (frequency of hospitalization) in total number, while there is no or slight pro-disadvantaged inequity with the wealth and education dimensions*

- *there is pro-advantaged income- and wealth-related inequity in the use of inpatient admissions in probability, while there is slight pro-disadvantaged education-related inequity*

- *there is almost no income- and wealth-related inequity in the use of inpatient days (length of hospitalization) in total number while there is considerable education-related pro-disadvantaged inequity*

- *large pro-advantaged inequity in the use of medical checkups exists in total number, as well as in probability, across all three SES dimensions; most of all, income-related inequity is the largest*

- *In particular, the magnitudes of pro-disadvantaged inequity in the use of medical checkups in probability are larger than those of total number*

- *there is high pro-advantaged inequity in the use of health care expenditure with the income and wealth dimensions, while education-related inequity is much less pro-advantaged*

- *the probability of visiting tertiary hospitals shows moderate levels of pro-advantaged inequity across all three SES dimensions, by and large*

1st bar: income-related, 2nd bar: wealth-related, 3rd bar: education-related
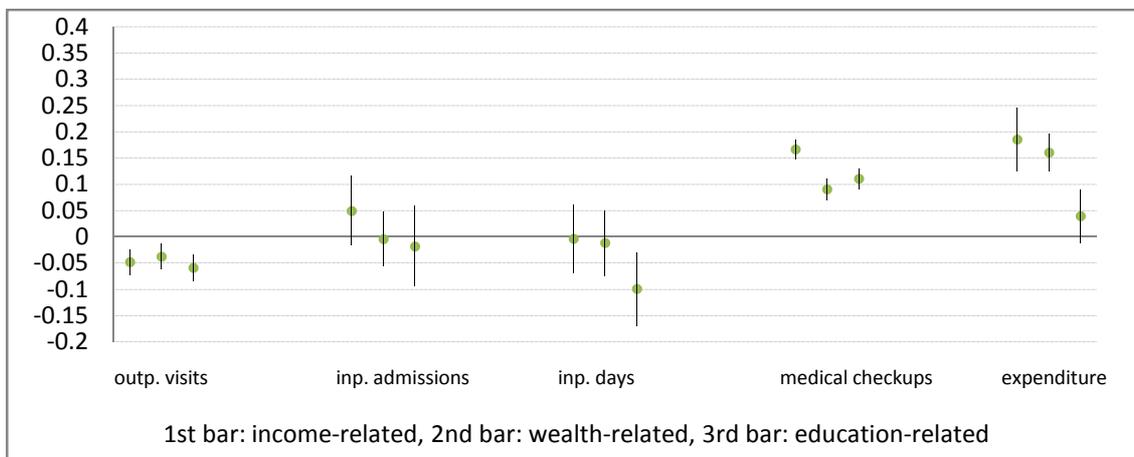
[FIGURE 7.26] COMPARISON OF EIs BY THREE SES DIMENSIONS IN 2008, PROBABILITY

1st bar: income-related, 2nd bar: wealth-related, 3rd bar: education-related
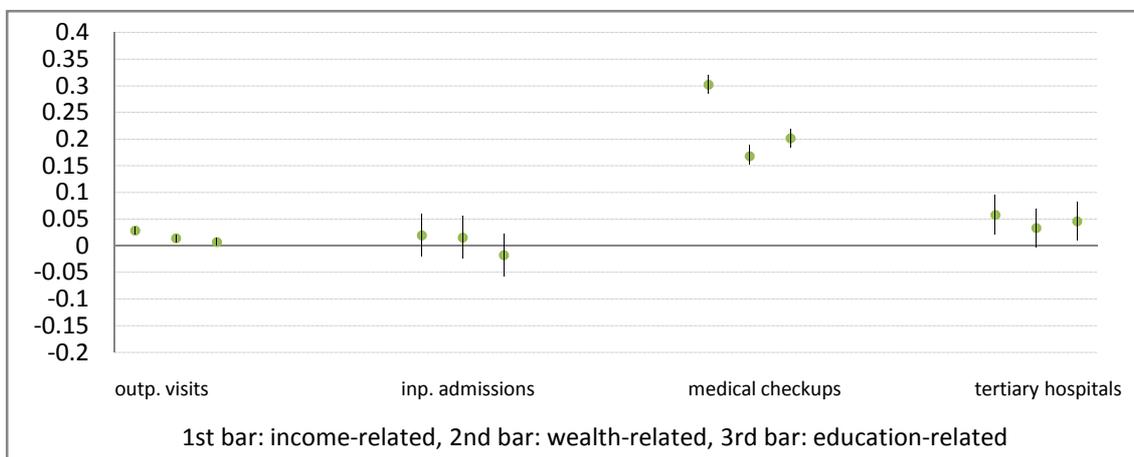
Based on the results of this study, it is clear that the health care services covered comprehensively by Korean National Health Insurance (KNHI), such as outpatient visits, inpatient admissions and inpatient days, show pro-disadvantaged inequity or no inequity in utilisation. On the other hand, visits that are considered preventive and/or entail high-out-of-pocket payments such as medical checkups, health care expenditure and tertiary hospital visits are more likely to be utilized by the advantaged, as [Figure 7.25] and [Figure 7.26] illustrate.

7.6.2   Discussions on Inequity in Health Care and Policy in Korea

In general, the average utilisation of health care in Korea is relatively higher among the OECD countries due to the characteristics of the Korea National Health Insurance (KNHI) system. KNHI generously covers outpatient and inpatient care services and the patients are

able to access those services without any official gatekeeping systems. The average annual visits for outpatient care in the current survey data is 12.4[84], indicating almost twice as many as visits than the OECD average, which is 6.6 (See Appendix 41); and the distributions of outpatient visits before and after need-standardization across the three SES dimensions show pro-disadvantaged inequity both in total number and probability. This implies that the outpatient visits after considering health care needs are utilized in accordance with health care needs rather than the SES status. However, it is arguable that pro-disadvantaged inequity in the use of outpatient care is wholly induced by the generous KNHI coverage or high needs for health care. Rather, it can be understood that the generous benefit coverage and high needs for health care, associated with the inappropriate quality of primary care provided to the disadvantaged may encourage them to visit doctors more often.

The quality of outpatient (primary) care may also influence the utilisation pattern of inpatient care services. The actual inpatient admissions and inpatient days are utilized more by the disadvantaged groups across the three SES dimensions. In particular, the concentration indices of inpatient days are fairly high with the income dimension (CIs= -0.1899) and the education dimension (CIs = -0.3000), although the need-standardized utilisation is almost equally distributed or show slight pro-disadvantaged inequity. This utilisation pattern of inpatient care implies that 1) inappropriate primary care may lead to frequent and long-term use of hospital services; and 2) the disadvantaged who are not affordable for preventive or primary care services prior to having severe illnesses utilize inpatient care more intensively.

Both actual and need-standardized medical checkups in this study show pro-advantaged inequity across the three SES dimensions alike. As medical checkups services in this study include luxury preventive medical checkups and diagnostic tests which are expensive and mostly not covered by KNHI, and regular basic checkups provided by the insurer[85], the services are more likely to be utilized by the advantaged who can afford to pay for the services or make themselves available to access those services physically. For that reason, the use of medical checkups is strongly associated with the SES status, not with health care needs. In addition, pro-advantaged inequity in the use of medical checks may also

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[84] According to the "OECD Health 2011," the average doctor consultation visits per year are 13, and this is the second highest among the OECD countries.

[85] The National Health Insurance Corporation (NHIC) provides basic medical checkups biennially with free of charge at the point of service delivery

influence on the pro-disadvantaged inequity in the use of inpatient care services because people who receive preventive medical checkups are less likely to utilize frequent or lengthy inpatient care.

The distributions of health care expenditure over the social gradient groups in different SES dimensions are also highly related to the access to the uncovered expensive health care services and high co-insurance/co-payment for taking diagnostic tests or innovative treatments/drugs, as well as the total volume of health care service used. As the benefit coverage of KNHI accounts for less than 60% of the total health care expenditure in Korea (See Appendix 1), equity in spending on health care according to each individual's health care needs can be a good indicator of equity of intensity or quality, rather than quantity (Lu et al., 2007). Therefore, both actual and need-standardized health care expenditure is distributed across the three SES groups in accordance with the SES status mostly, but each SES dimension shows different types of utilisation distributions due to the different patterns of health care needs.

For the income dimension, the distribution of actual utilisation is less skewed to the high income quintile group, showing slight pro-advantaged inequity (CI=0.0852) while need-standardized utilisation is obviously skewed toward the highest income quintile group (HIwv =0.1853). This implies that the high health care needs of the lower income quintile groups lead them to spend on health care to some degree, but the amounts spent by the low income quintiles are too low to explain that health care expenditure spent by the all quintile groups are equal for the equal needs.

In case of the education dimension, low education groups have higher actual health care expenditures (CI= -0.1191), which may be incurred by the extreme concentration of need by the low education groups; however, need-standardized health care expenditure is spent more by the second lowest and the highest education groups with the HIwv index of 0.0394, which has relatively small pro-advantaged inequity, compared to the other SES dimensions. Also, health care needs, particularly age, are distributed relatively equally across the wealth quintile groups or in favour of the wealthier quintile groups.

The actual use of tertiary hospital visits is also utilized in accordance with the distributions of health care needs-- high pro-disadvantaged utilisation with the income and education dimensions, while slightly pro-advantaged utilisation is found with the wealth dimension. Taking health care needs into account, the utilisations by the three SES dimensions show

somewhat pro-advantaged inequity-- the highest EI in the income dimension (0.0581) and the 2nd highest with education dimension (0.0458) and the lowest with the wealth dimension (0.0337). This also implies that although the less advantaged with severe disease conditions may have higher probability to visit tertiary hospitals than their counterparts, the probability of need-standardized utilisation of the less advantaged is lower than the more advantaged, if their health care needs are the same.

Consistent with the previous studies on equity in health care utilisation in Korea, *income* is the most definitive (or sensitive) socioeconomic dimension in explaining social gradient utilisation of health care (Lu et al., 2007) among the three SES dimensions used for this study. The universal health care system with the high out-of-pocket payment ratio in Korea may make the disadvantaged (the low incomes) hesitate to access intensive and/or quality health care services which are not generously or never covered by KNHI. In addition, rapidly adopted new health care technologies under the severe medical arms race among the health care providers in Korea are also becoming available to patients who can afford to those services, as a form of non-covered health care services. If the current benefit coverage of KNHI continues to cover partial health care services without proper resources rationing through an official gatekeeping system, there is a high possibility of increasing pro-advantaged (rich) income-related inequity in the use of medical checkups, health care expenditure and tertiary hospital visits.

Compared to the income and education dimensions, relatively smaller impacts of need standardization are found with the wealth dimension because the most advantaged group utilizes more health care based on their high health care needs-- rather than on their socioeconomic status. However, it would be meaningful to observe the future changes of equity in health care utilisation in accordance with the recent tendency toward increasing wealth inequality due to the expanded implementation of neoliberal social and economic policies in Korea[86].

In conclusion, there is SES-related inequity in the use of medical checkups, health care expenditure and tertiary hospitals in Korea. On the other hand, owing to the generous benefit coverage of the KNHI program, there is almost no SES-related inequity in the use of outpatient and inpatient care services. Among the three dimensions of income, wealth and education, income is most sensitive to the social gradient utilisation of health care and

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[86] See [Figure 5.1] in Chapter 5.

the wealth is the least sensitive.

7.6.3   Methodological Issues

As the HI*wv* and Erreygers indices used for measuring SES-related inequity in health care utilisation are often criticized due to its difficulties in interpreting the true meaning of the magnitude or significance of inequity (Jones & Rice, 2004; Macinko & Lima-Costa, 2012), some complementary approaches are suggested to help capture the meaning more clearly[87] (Koolman & van Doorslaer, 2004). For this study, the extreme group inequality indices displayed in [Table 7.7] may provide another simple approach to understanding the

[TABLE 7.7] EXTREME GROUP INEQUALITY INDICES

Utilisation	SES Dimension	HIwv (EI)	Extreme Group Relative Inequality Ratio*	Extreme Group Absolute Inequality Gaps**
Outpatient Visits (prob.)	Income	-0.0480 (0.0289)	77 % (105%)	-3.286 (0.034)
	Wealth	-0.0378 (0.0142)	85 % (102%)	-2.153 (0.011)
	Education	-0.0590 (0.0070)	70 % (101%)	-4.945 (0.010)
Inpatient Admissions (prob.)	Income	0.0495 (0.0200)	136 % (121%)	0.054 (0.023)
	Wealth	-0.0043 (0.0158)	93 % (114%)	-0.166 (0.016)
	Education	-0.0181 (-0.0173)	107 % (86%)	0.012 (-0.018)
Inpatient Days	Income	-0.0039	126 %	0.569
	Wealth	-0.0116	95 %	-0.134
	Education	-0.0993	62 %	-1.466
Medical Checkups (prob.)	Income	0.1667 (0.3022)	210 % (206%)	0.334 (0.320)
	Wealth	0.0905 (0.1681)	144 % (148%)	0.150 (0.156)
	Education	0.1107 (0.2018)	182 % (181%)	0.254 (0.248)
Health Care Expenditure (KRW)	Income	0.1853	233 %	512,444 (=US$427)
	Wealth	0.1606	193 %	407,704 (=US$340)
	Education	0.0394	176 %	295,600 (=US$246)
Tertiary Hospital Visits	Income	0.0581	234 %	0.132
	Wealth	0.0337	176 %	0.118
	Education	0.0458	259 %	0.076

Note: *   the utilisation mean ratio between the most advantaged group and the most disadvantaged group
(= the most advantaged/the most disadvantaged * 100)
**   the utilisation mean gap between the most advantaged group and the most disadvantaged group
(= the most advantaged - the most disadvantaged)

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[87] Kooman, X. and van Doorslaer, E. (2004) suggest that multiplying 75 to the concentration index yields the percentage of total utilisation which should be redistributed from individuals in the most advantaged half to individuals in the most disadvantaged half of the population in order to achieve an equal distribution. Although this approach may give some numbers to readers understand better on the index itself, still not as clear as the comparison between the extreme groups, demonstrated as [Table 7.7].

magnitude of inequity in the use of health care between the two extreme groups (the most advantaged and the most disadvantaged) with both relative and absolute approaches. For outpatient visits, individuals in the most advantaged group utilize far less services (77%, 85%, and 70% by each SES dimension) than individuals in the most disadvantaged group. The absolute gaps are calculated in [Table 7.7]. As previously mentioned, medical checkups, health care expenditure and tertiary hospital visits are more utilized by the advantaged. For example, the highest income quintile group utilizes more than twofold medical checkups, health care expenditure and tertiary hospitals than the poorest income quintile group (210%, 233% and 234% more, respectively). The directions and the degrees of the three SES-related inequity in utilisation expressed by the extreme group comparisons are analogous to those of the pertinent HI*wv* indices. Also, the extreme group comparisons of probability show similar patterns of inequity to the EIs in probability.

Each method has its own advantages as well as shortcomings demonstrating the magnitude of SES-related inequity in health care utilisation. The extreme group inequality indices may highlight the gaps between the two extreme groups with a simpler indicator (%); however, it may not be able to capture the inequality caused by second most advantaged (disadvantaged) group has the most highest (lowest) frequency of health care utilisation.

Regarding to the need distribution patterns across the education groups in this analysis, some cultural backgrounds need to be discussed as well. Previous studies around the globe, including Korea, have reported that education is one of the strongest socioeconomic factors that influence health outcomes and health care utilisation (Khang et al., 2004c; Son, 2002). However, the unique historical context during the early and mid-twentieth century in Korea-- experiencing the Japanese colonial rule period and the civil war, together with the long-standing Confucian tradition--, higher education had been allowed to only a small segment of the population, mainly rich males in the past (See Appendix 42). This can explain why the lowest education group is among the oldest (mean age of 72.98) and the sickest and why this group uses more health care than the other education groups. However, the influence of educational gradient with the current education classification (grouping by graduation level) system on health care utilisation may be reduced gradually in accordance with the overall enhancement of the educational attainment rate in Korea in the near future.

Chapter 8: Equity Change in Health Care Utilisation, 2005 & 2008

8.1   Introduction

According to the analysis result of the presenting study followed, there are statistically significant reduction in education-related inequity for inpatient days, medical checkups and health care expenditures (in total number) and outpatient visits, inpatient admissions, medical checkups and tertiary hospital visits (in probability) between 2005 and 2008 in Korea; but further methodological issues need to be addressed. On the other hand, almost no statistically significant inequity changes have been found among income- and wealth-related inequity between the two years-- except the wealth-related inequity in the use of tertiary hospital visits (in probability). This chapter will demonstrate the results of descriptive analysis of the variables of interest and empirical analysis of inequity changes between 2005 and 2008, as well as its policy background.

8.2   Social Policy Background

As mentioned in Chapter 4, some important SES-related indicators show widening income inequality in Korea, although national income is continuously growing between 2005 and 2008 [Table 8.1]. The Gini coefficient in 2008 is 3.344, which indicates worsened inequality than that of 2005 (3.306). The simple comparison showing the income gap between the richest 5th and the poorest 5th also says that there is a widening income

[TABLE 8.1] CHANGES OF MAJOR SES-RELATED INDICATORS BETWEEN 2005 & 2008

	GDP per Capita (US$, PPP)[88]	Income Inequality Indices		Health Care Expenditure	
		Gini Coefficient	Richest 5th/ Poorest 5th	per Capita (US$, PPP)	OOP Payment ratio to THE
2005	22,783	0.306	5.53	1,282	37.5
2008	26,689	0.344	7.38	1,759	35.5

Source: OECD, "Country Statistical Profile: Korea."; Ministry of Health and Welfare (2013)

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[88] The figures of GDP per Capita demonstrated in this chapter are somewhat different from those in Chapter 5, due to difference in data source. The figures in this chapter are expressed in US$, PPP, while the figures in Chapter 5 are expressed in nominal US$.

[TABLE 8.2] MAJOR BENEFIT COVERAGE EXPANSION IMPLEMENTED B/W 2005 & 2008

Classification	Major Items of Expanded Benefit Coverage
2005	- Began to cover MRI exams (diagnostic purposes for specific diseases) - Coinsurance waiver of natural child birth - Coinsurance reduction for mental health outpatient care (30~50% → 20%) - Began to cover cochlear implant - Expanded coverage of medical equipment for the disabled (electronic wheelchairs, etc.) - Expanded coverage of Medical materials for osteoporosis (60 → 90days) - *Coinsurance reduction for cancer and severe disease treatment (20% → 10%)*
2006	- Coinsurance waiver of inpatient care for children under 6 - Began to cover organ transplant surgeries - *Coinsurance reduction of certain cancer screening tests (50% → 20% reduction of stomach, breast, colon and liver cancer , waiver of cervical cancer)* - Began to cover PET exams for severe diseases like cancers, heart and brain diseases - Began to cover hospital food (coinsurance: 20%) - Expanded coverage of childbirth outside of health care institutions (US$60 → US$210)
2007	- Expanded coverage of rare diseases, ambustion and specialized rehabilitation therapy - Coinsurance reduction of outpatient care for children under 6 - Reduction of annual ceiling of coinsurance
2008	- Coverage reduction of inpatient care for children under 6 (0% → 10%) - Coverage reduction of hospital food (20% → 50%) - Listed more disease codes for benefit coverage

Source: Key Statistics of KNHI in 2009, NHIC (2010)

[FIGURE 8.1] THE RISE OF PRIVATE HEALTH INSURANCE OF TOTAL HEALTH EXPENDITURE, 1980~2008
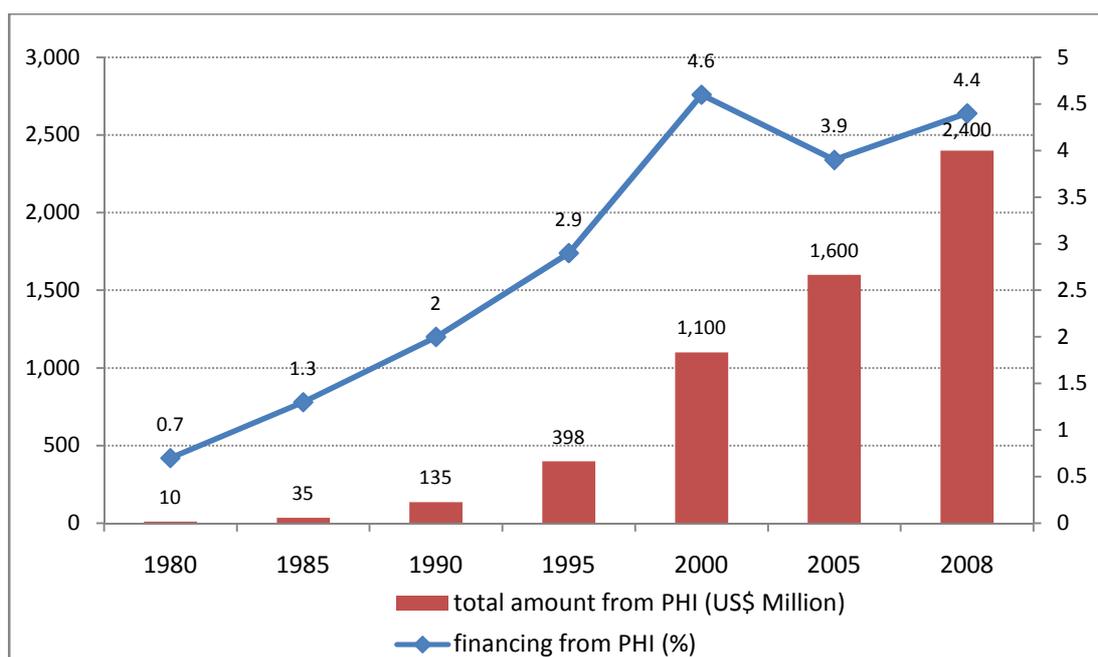
Source: Korean National Health Accounts and Total Health Expenditure in 2008, Jeong, HS (2010).

inequality in Korea. In the same way, the overall increase of health care expenditure in 2008 (37%) does not reduce out-of-pocket payment ratio to the total expenditure on health (TEH) meaningfully. This may imply that there is lack of an income redistribution mechanism in the society in general.

As part of recent policies reducing inequalities in Korea, the governments have attempted to expand a wide range of welfare benefits, including health care benefits, in response to the rising needs of the people. In this connection, an important health care policy was implemented, which mainly focused on expanding health insurance benefit coverage for the patients with severe diseases (i.e. cancers and rare diseases) between 2005 and 2008, as [Table 8.2] demonstrates. Together with the health care benefit expansion, there was also a growth in private health insurance in Korea, as shown in [Figure 8.1]. It is difficult to come up with the direct causal relationship between the inequity changes and the policy impact on health care utilisation through this study due to the limitation of the analytical method.

However, it is meaningful to observe the changes as a baseline study to follow up the inequity changes in health care utilisation in the long term. In the later part of this chapter, some possible factors that may affect SES-related health care utilisation in Korea will be discussed.

8.3   Descriptive Statistics

8.3.1   Change in Distribution of Need Factors

8.3.1.1   Age and Gender

Due to the characteristics of the panel survey data, there are only minor changes in the distributions of age and gender across the three SES groups. The mean age of each SES groups is slightly increased, reflecting the three year gap between 2005 and 2008; however, the actual difference is not by the full three years because of sample attrition[89] due to death or dropouts, which affects elderly people more than the young.

[FIGURE 8.2] TOTAL GENDER RATIO CHANGE, 2005 & 2008
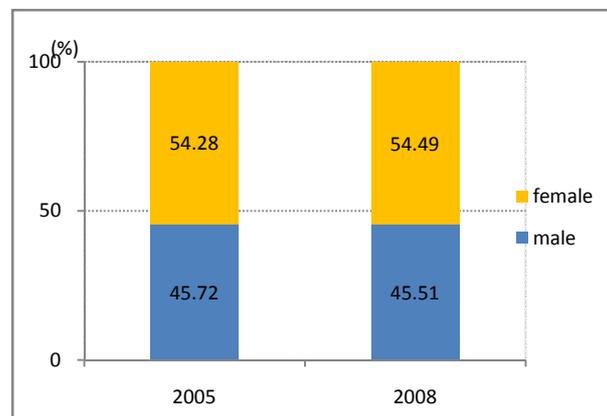
The gender mix in both years is almost identical, showing somewhat more females for both years (54.28% and 54.49%, respectively) [Figure 8.2]. The distributions of ages across the three SES groups for both years have almost the same mean age and distribution patterns, indicating that older individuals are more disadvantaged along with the income and education dimensions [Figure 8.3]. In particular, the least educated are much older than others. For both years, on the other hand, the mean age is almost equal across the wealth quintile groups [Figure 8.3].

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[89] The attrition rate of the 4th wave data (2008) is 17.66% based on the first wave data (2005).

[FIGURE 8.3] MEAN AGE BY THREE DIMENSIONS OF SES GROUPS, 2005 & 2008

[FIGURE 8.3] MEAN AGE BY THREE DIMENSIONS OF SES GROUPS, 2005 & 2008
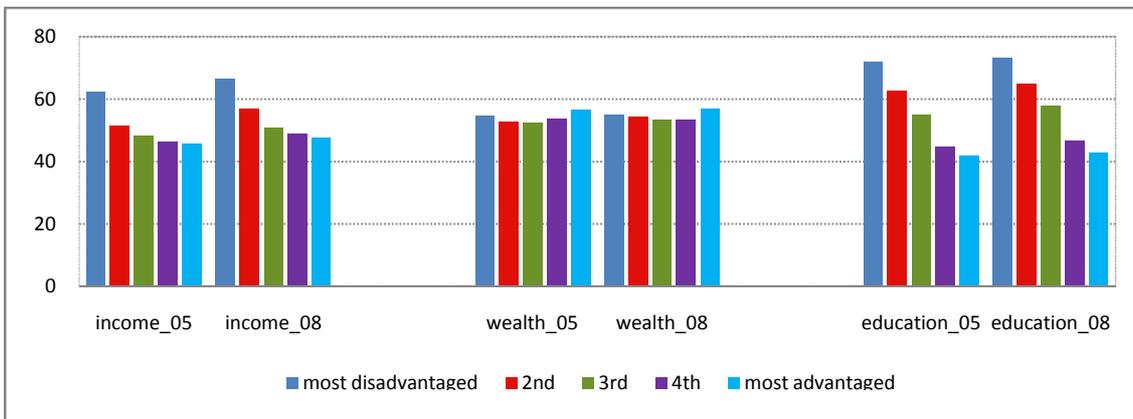
8.3.1.2 Health Status

Self-Assessed Health (SAH)

The distribution patterns of the mean scores of SAH across the groups for each SES dimension for both years are very similar while the mean scores of the disadvantaged are slightly reduced in 2008. This means that the sample population perceive their overall health status to have improved slightly in 2008; however, the more disadvantaged express that their health status have been lowered (higher mean scores of SAH) compared to the more advantaged. Similar to the mean age distribution, the skewed distributions of higher SAH scores toward the disadvantaged are sharper with the income and education dimensions while the distribution is moderate among the wealth quintile groups, as [Figure 8.4] indicates.

[FIGURE 8.4] MEAN SCORE CHANGE OF SAH BY THREE DIMENSIONS OF SES GROUPS, 2005 & 2008
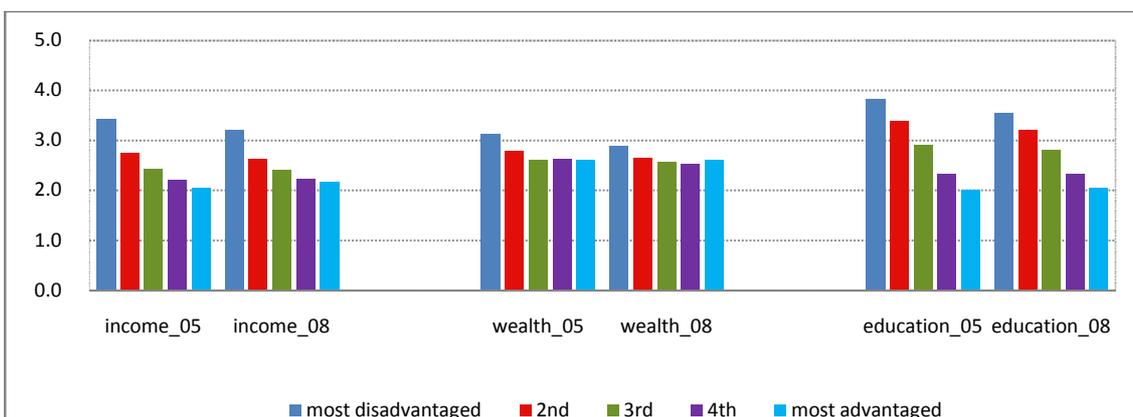
Disease

The probability distributions of having any disease are also highly concentrated in the disadvantaged with the income and education dimensions while the distribution among the wealth quintile groups are much less skewed to the disadvantaged. The probabilities of having any disease for the disadvantaged in 2008 are higher than those of the advantaged in general, while the pro-disadvantaged distribution patterns across the three SES dimensions are very similar for both years [Figure 8.5].

[FIGURE 8.5] PROBABILITY CHANGE OF ANY DISEASE BY THREE DIMENSIONS OF SES GROUPS, 2005 & 2008
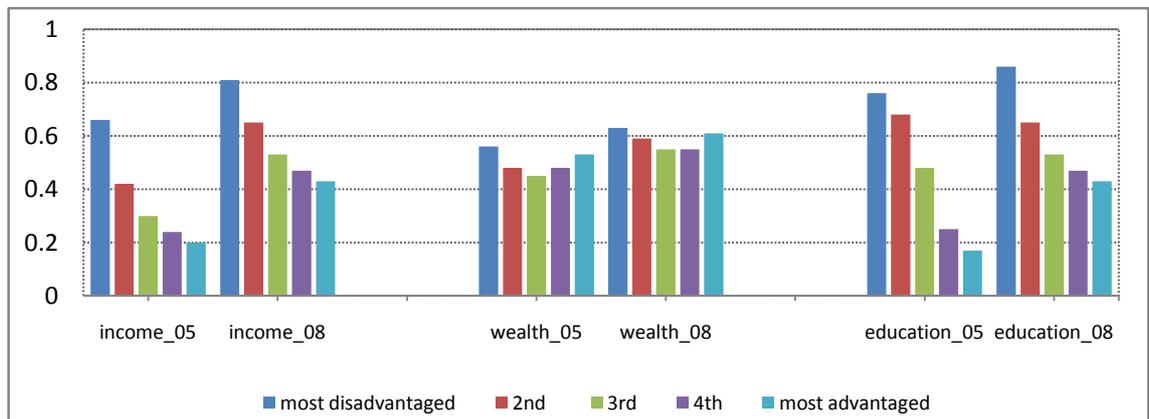
Disability

The probability distributions of having any disability across the three SES groups are heavily and sharply skewed toward the disadvantaged and the gaps between the two extreme groups are wider in 2008 for the income and education dimensions. For the wealth

[FIGURE 8.6] PROBABILITY CHANGE OF ANY DISABILITY BY THREE DIMENSIONS OF SES GROUPS, 2005 & 2008
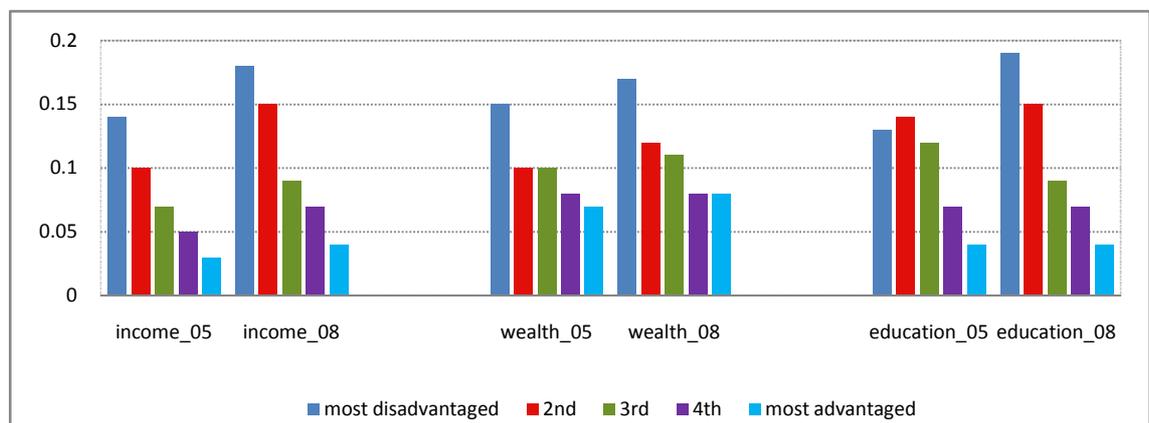
dimension, there are also high concentrations of probability on the disadvantaged, but little changed had been made between the two years [Figure 8.6]

Chronic Conditions

Like other distributions of the need probability described before, the distributions of any chronic condition are severely concentrated in the disadvantaged among the income and education (quintile) groups and the overall mean probability of having chronic condition across the income and education groups is higher in 2008 [Figure 8.7]. On the other hand, the probability of having any chronic condition across the wealth quintile groups are relatively equally distributed than those with the other SES dimensions for both years [Figure 8.7].

[FIGURE 8.7] PROBABILITY CHANGE OF ANY CHRONIC CONDITION BY THREE DIMENSIONS OF SES GROUPS, 2005 & 2008
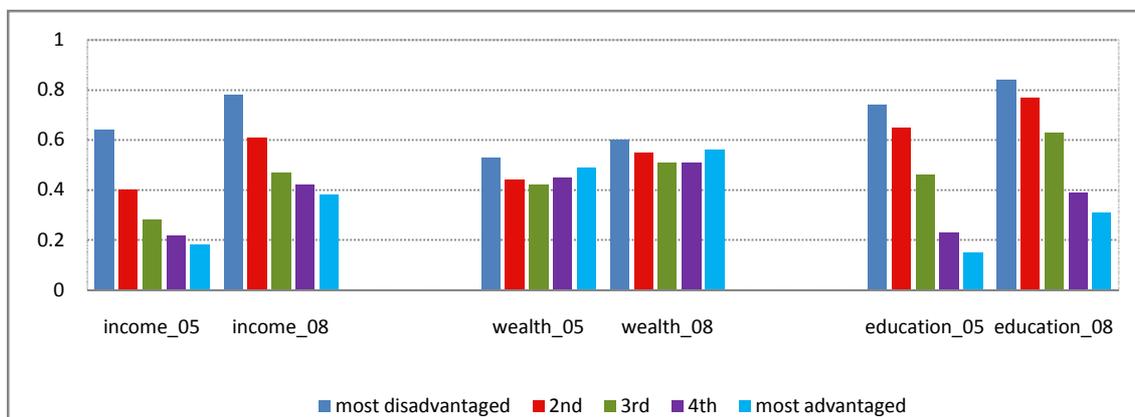
8.3.2   Change in Distribution of non-Need Factors

8.3.2.1   Income vs. Wealth vs. Education

The clusters between household income and wealth for the two years indicate overall increase in 2008 [Figure 8.8]. The mean household income had increased to

[TABLE 8.3] MEAN CHANGES OF HOUSEHOLD INCOME AND WEALTH B/W 2005 & 2008

Classification	2005	2008
Household Inome (KRW)	1,463,510 (=US$12,240)	18,275,260 (=US$16,614)
Household Wealth (KRW)	85,319,530 (=US$77,563)	125,628,400(=US$114,208)

[FIGURE 8.8] RELATIONSHIP CHANGE BETWEEN INCOME AND WEALTH, 2005 & 2008

(unit: 10,000KRW)
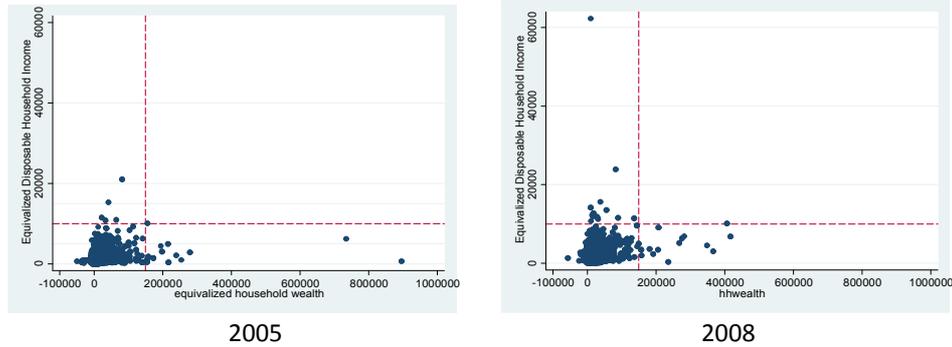
| 2005 | 2008 |

[FIGURE 8.9] MEAN HOUSEHOLD INCOME AND WEALTH BY EDUCATION GROUP, 2005 & 2008

(Unit: 10,000 KRW)

EDUCATION VS. INCOME   EDUCATION VS. WEALTH
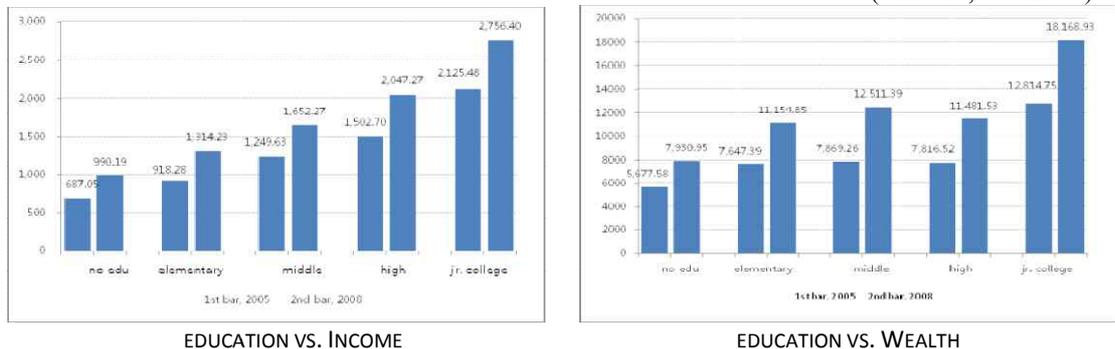
18,275,260KRW in 2008 from 13,463,510KRW in 2005, and the mean household wealth also substantially increased to 125,628,400KRW in 2008 from 85,319,530KRW in 2005 [Table 8.3]. With regard to the household income and wealth changes by education group, the distribution pattern of household income across the education group in 2008 is quite similar to that of 2005 representing the increased mean household income distribution, while the magnitudes of the household wealth growth among the middle three wealth quintile groups in 2008 is wider than the other wealth quintile groups in 2008 [Figure 8.9].

8.3.2.2   Employment and Welfare Uptake Status

Although there are minor changes in the distributions of probability of having permanent work positions and welfare uptakes between the two years, the distribution patterns are almost the same as [Figure 8.10] and [Figure 8.11]. There is a higher positive correlation between having permanent work position with income and education levels than with wealth levels. It is because the wealthier are more likely to be older and less likely to work
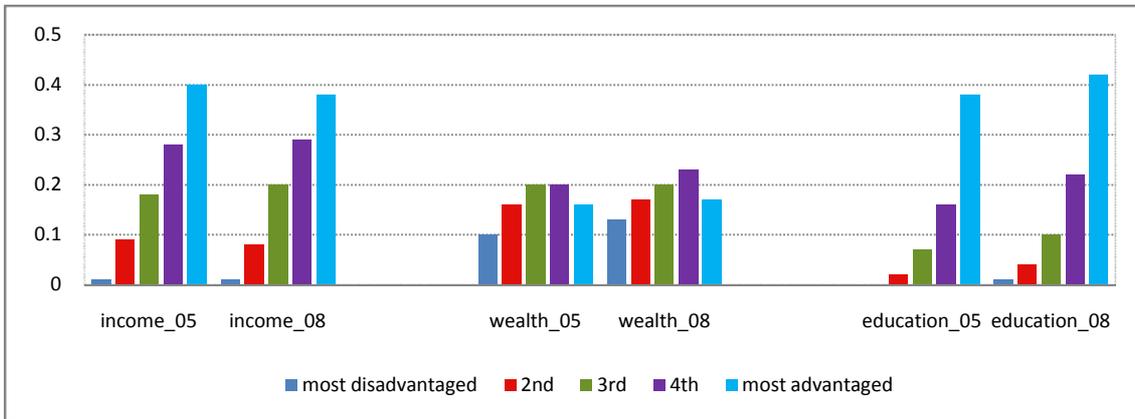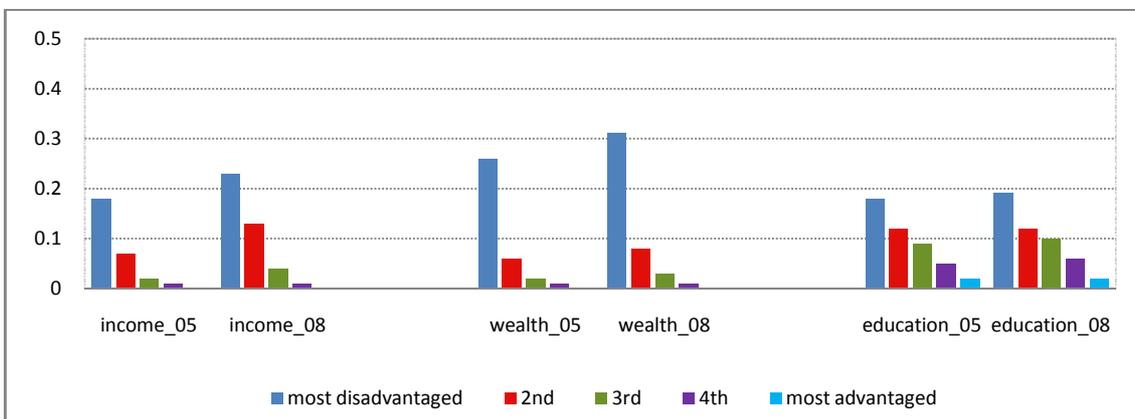
[Figure 8.10]. On the contrary to this, the chances for welfare uptakes are strongly correlated negatively with the financial status-- income and wealth while there is less negative correlation with education levels [Figure 8.11].

8.3.3   Summary

In general, the distribution patterns of the need factors, such as age, SAH, disease, disability and chronic condition between 2005 and 2008 are almost the same, indicating a high concentration of the need factors for the disadvantaged status. Particularly, the education-related health care need distributions are most steeply skewed toward the most disadvantaged while the need distributions across the wealth quintile groups show less skewed to the most disadvantaged or almost even distribution across the quintile groups. The distribution patterns of the non-need factors also demonstrate a little change between

the two years. However, the disadvantaged have a much smaller chance of having permanent work positions and a higher chance of receiving welfare benefits.

8.4 Changes in Income-Related Inequity

8.4.1 Introduction

The overall volumes of actual health care utilisation, in total number and probability, have increased in 2008, except inpatient days and tertiary hospitals. The distribution patterns for the two years are nearly the same across the income quintile groups, indicating high concentration on the low income groups for outpatient visits, inpatient admissions and inpatient days while the distribution patterns for medical checkups, health care expenditure and tertiary hospital visits show opposite. After standardizing health care needs, very small slight pro-poor or pro-rich inequity is found in the uses of outpatient visits, inpatient admissions and inpatient days while there is significant pro-rich inequity in the uses of medical checkups, health care expenditure and tertiary hospital visits. No statistically significant income-related inequity changes in health care utilisation are observed between 2005 and 2008.

8.4.2 Total Number of Health Care Utilisation by Income Quintile Groups

8.4.2.1 Need-Standardization of Health Care Utilisation, 2005 & 2008

The distribution changes of actual and need-standardized health care utilisation by the income quintile groups between 2005 and 2008 will be described in the following section[90].

- The distributions of total number of actual outpatient visits, inpatient admissions and inpatient days are highly concentrated on the low income quintile groups for both years while their need-standardized utilisation is less concentrated on the low income quintile groups or distributed with no clear pattern [Figure 8.12].

- There are outstanding increases of the average actual medical checkups (132%) and health care expenditure (141%) in 2008, compared to the actual utilisations in 2005 [Table 8.4]. After health care needs are standardized, the distributions of health care expenditure as well as medical checkups are clearly concentrated in the richest income quintile groups for both years. However, actual health care expenditure was spent more by the low income quintile groups due to their higher

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[90] See [Appendix 15] for the table of health care utilisation change by income quintile (2005 & 2008) in total number.

[FIGURE 8.12] INDIRECTLY NEED-STANDARDIZED HEALTH CARE UTILISATION BY THE INCOME QUINTILES 2005 & 2008, TOTAL NUMBER

OUTPATIENT VISITS

INPATIENT ADMISSIONS

INPATIENT DAYS

MEDICAL CHECKUPS

HEALTH CARE EXPENDITURE
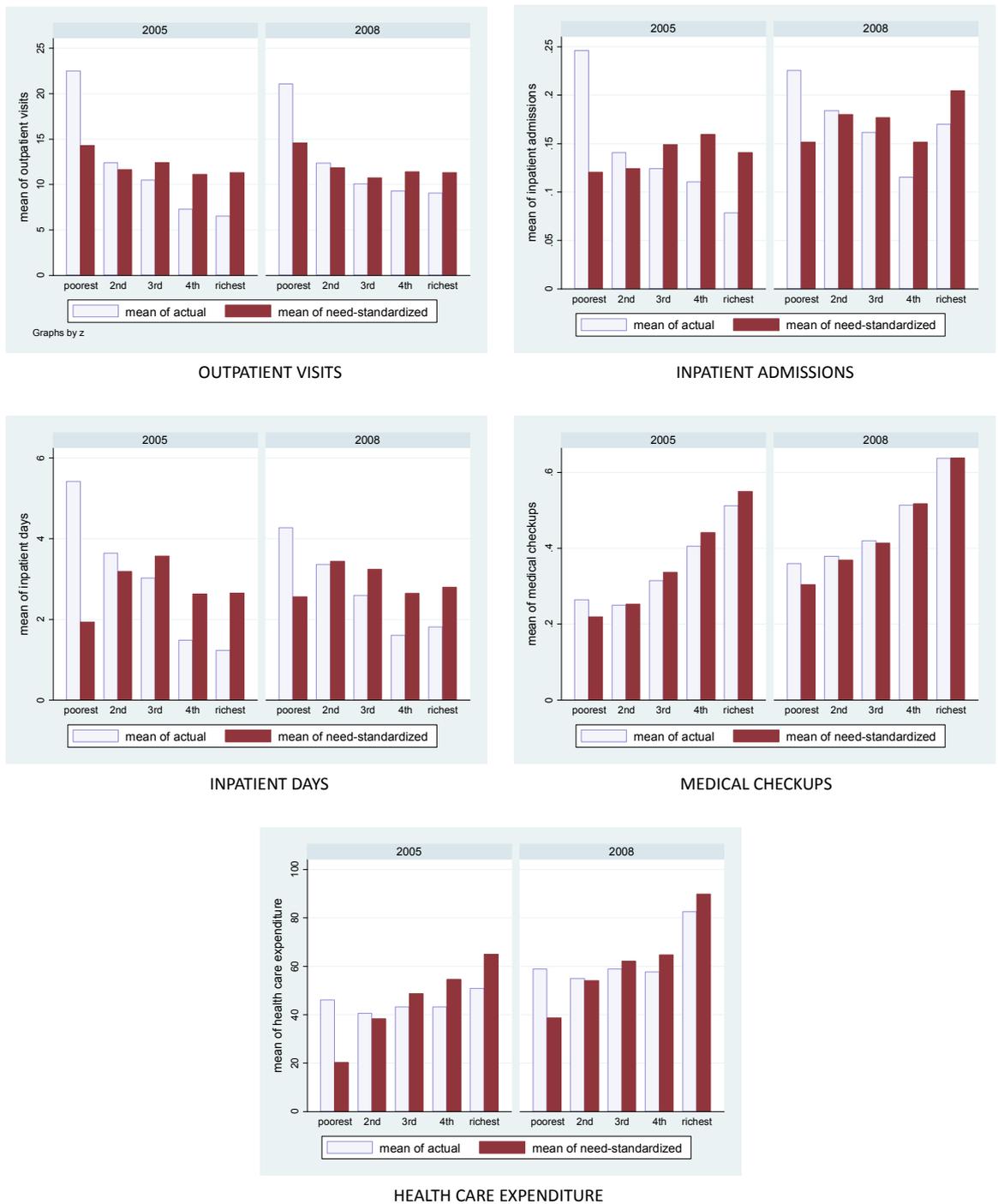
[TABLE 8.4] CHANGES IN THE EXTREME GROUP RELATIVE INEQUALITY RATIOS B/W 2005 & 2008, MEDICAL CHECKUPS & HEALTH CARE EXPENDITURE, TOTAL NUMBER (INCOME)

Classification	2005			2008		
	Poorest	Richest	Ratio	Poorest	Richest	Ratio
Medical Checkups	0.2192	0.5499	250%	0.3042	0.6378	210%
Health Care Expenditure(KRW)	202,973	650,131	320%	386,362	898,806	233%

health care needs while actual medical checkups are utilized in accordance with income level.

8.4.2.2 Income-related HI*wv* Indices in Total Number

This section will explain the income-related inequtiy changes between 2005 and 2008 with concentration curves and HI*wv* indices. [Figure 8.13][91,92].

- The HI*wv* indices for outpatient visits indicate slight pro-poor inequity for both years with groups for both years.
- The utilisations of inpatient admissions for both years appear slightly pro-rich-- not changed a lot in terms of the direction as well as the degree of inequity.
- In case of inpatient days, the direction of inequity looks slightly changed from pro-advangtaged to pro-poor, which is very close to "no income-related inequity line."
- For medical checkups and health care expenditure, the areas between the line of equality and the concentration curves for both years are considerably large in the pro-rich direction, showing mixed changes in inequity in health care utilisation. The HI*wv* for medical checkups indicates less pro-rich inequity, as [Figure 8.13] shows.
- In case of health care expenditure, the HI*wv* index of 2008 indicates somewhat worsened pro-rich inequity from the index of 2005 [Appendix 39].

[FIGURE 8.13] COMPARISON OF INCOME-RELATED HI*WV* INDICES B/W 2005 & 2008, TOTAL NUMBER

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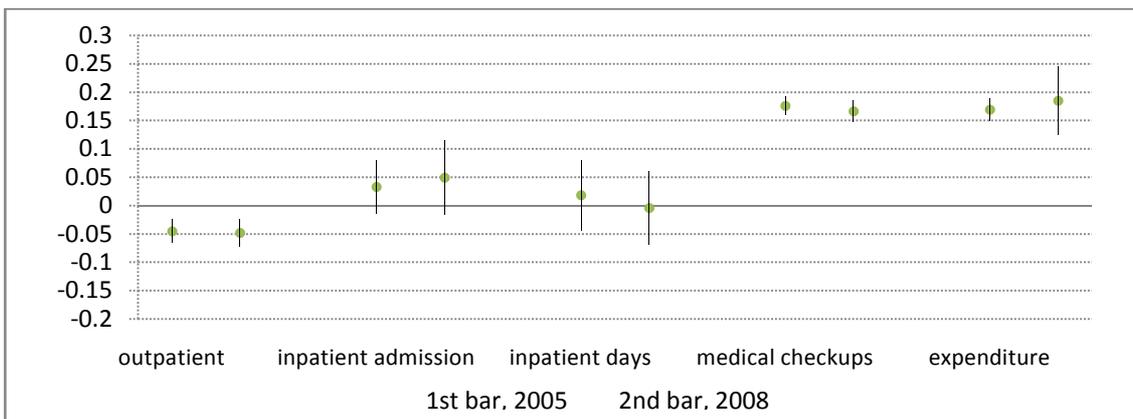
[91] See [Appendix 33] for the income-related concentration curves for health care utilisation (2005 & 2008) in total number

[92] See [Appendix 39] for the table of changes of income-related inequity indices b/w 2005 & 2008 in total number.

In summary, the distribution trends of health care utilisation across the income quintile groups are very similar, showing minor changes between the two years. The HI*wv* indices for both years are almost equal or very slightly pro-rich/pro-poor inequity in the use of outpatient visits, inpatient admissions and inpatient days, while the indices of medical checkups and health care expenditure show considerably pro-rich.

8.4.2.3 Test of Income-related Inequity Changes between 2005 & 2008, Total Number

This section will provide the statistical test of the income-related inequity changes between 2005 and 2008 based on a regression analysis with a time and rank interaction term. There are no statistically significant income-related inequity changes in health care utilisation, in total number, between 2005 and 2008 in Korea. The coefficient of the interaction term with time and rank for outpatient visits has a negative value but not a meaningful change (-0.0027). The coefficients for inpatient admissions and health care expenditure with positive values indicate increased magnitudes of pro-rich (worsened) inequity while the coefficient for inpatient days and medical checkups with negative values indicate some improvement of pro-rich inequity. However, the changes are not statistically significant ($p>0.05$) and this result is quite consistent with the income-related inequity comparisons with the HI*wv* indices and their confidence intervals (95% level) [Table 8.5] [Figure 8.13].

[TABLE 8.5] INCOME-RELATED INEQUITY CHANGE B/W 2005 & 2008, TOTAL NUMBER

	Coefficient	P> |t|	Confidence Intervals (95% Level)
Outpatient Visits	-0.0027	0.866	-0.0345 ~ 0.0290
Inpatient Admissions	0.0164	0.691	-0.6456 ~ 0.0974
Inpatient Days	-0.0221	0.629	-0.1120 ~ 0.0678
Medical Checkups	-0.0094	0.458	-0.0344 ~ 0.0152
Health Care Expenditure	0.0162	0.615	-0.0470 ~ 0.0794

8.4.3 Probability of Health Care Utilisation by Income Quintile Groups

8.4.3.1 Need-standardization

The probability distribution changes of actual and need-standardized health care by the income quintile groups between 2005 and 2008 will be described in the following section[93]. The overall probability of health care use increases in 2008, except tertiary hospital visits [Figure 8.14].

- The probability distributions of actual outpatient visits are slightly more concentrated in the poorest for both years while the need-standardized probabilities are almost evenly distributed across the income quintile groups.

- The average probability of actual inpatient admissions is considerably higher in 2008 than in 2005, and the probability distributions for both years are highly concentrated (2005) or somewhat concentrated (2008) on the poor income quintile groups. However, the need-standardized inpatient admissions are more concentrated in the higher income quintile groups for both years.

- In case of medical checkups, the average probability of utilisation in 2008 increased by 130% from 2005; however, the probability distribution patterns across the income quintile groups for both years are similar, skewing heavily toward the higher income groups [Figure 8.14].

- On the other hand, the average probability of actual tertiary hospital visits in 2008 is somewhat reduced from 2005 and the distributions for both years are concentrated in the low income quintile groups; however, the distributions of the need-standardized tertiary hospital visits are considerably concentrated in the advantaged for both years. As [Table 8.6] indicates, the extreme group relative inequality ratios of medical checkups and tertiary hospital visits are more than 200%-- more than twofold utilisation by the richest compared to the poorest--for both years, but the ratios had been reduced in 2008.

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[93] See [Appendix 16] for the table of health care utilisation change by income quintile (2005 & 2008) in probability.

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[FIGURE 8.14] INDIRECTLY NEED-STANDARDIZED HEALTH CARE UTILISATION BY THE INCOME QUINTILES 2005 & 2008, PROBABILITY

OUTPATIENT VISITS

INPATIENT ADMISSIONS

MEDICAL CHECKUPS

TERTIARY HOSPITAL VISITS
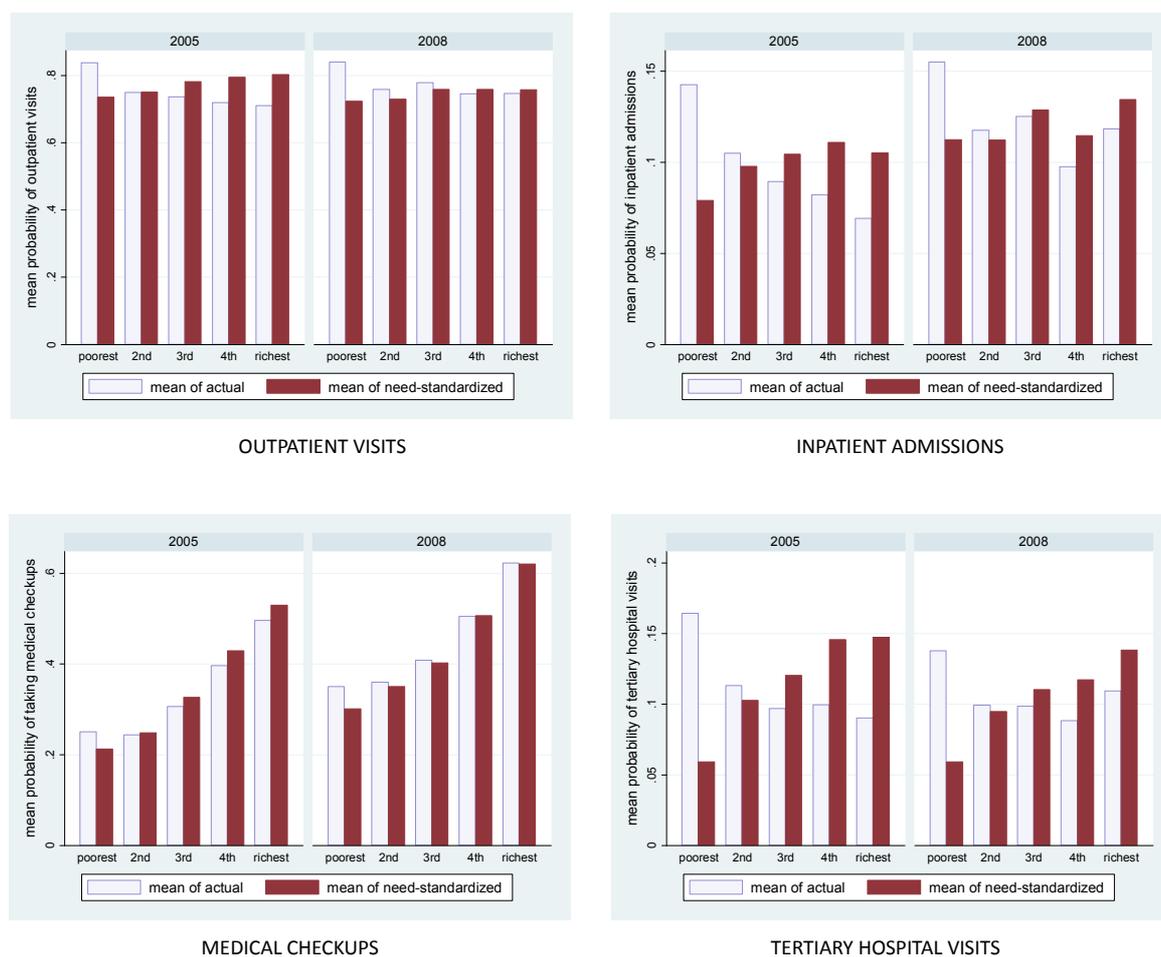
[TABLE 8.6] CHANGES IN THE EXTREME GROUP RELATIVE INEQUALITY RATIOS OF 2005 & 2008, MEDICAL CHECKUPS & HEALTH CARE EXPENDITURE, PROBABILITY (INCOME)

Classification	2005			2008		
	Poorest	Richest	Ratio	Poorest	Richest	Ratio
Medical Checkups	0.2123	0.5295	249%	0.3012	0.6208	206%
Tertiary Hospital Visits	0.0593	0.1474	250%	0.0592	0.1384	234%

8.4.3.2 Income-related Erreygers Concentration Indices in Probability

The income-related inequity changes in health care utilisation of probability for 2005 and 2008 will be presented in the following section with the EIs[94][95] [Figure 8.15].

- For outpatient visits, the EIs for both years shows equal or very slight pro-rich inequity, which means the sample population regardless of income level may have the fair opportunities when they have the same health care needs.

- For probability of inpatient admissions, EIs for both years show little inequity with almost no inequity change between the two years.

- For the use of medical checkups shows large pro-rich income-related inequity. The EI for medical checkups in 2008 is 0.3022, which means very slightly reduced (improved) inequity from the index of 2005 (0.3125).

- The EI for tertiary hospital visits in 2008 (0.0581) shows very slight inequity improvement from that of 2005 (0.0679).

In summary, the EIs of outpatient visits and inpatient admissions of the income quintile groups, in probability, show almost equal utilisation both in 2005 and 2008, while the indices of medical checkups indicate large pro- rich inequity for both years. The indices for tertiary hospital show somewhat pro-rich inequity for both years without

[FIGURE 8.15] COMPARISON OF INCOME-RELATED ERREYGERS INDICES B/W 2005 & 2008, PROBABILITY

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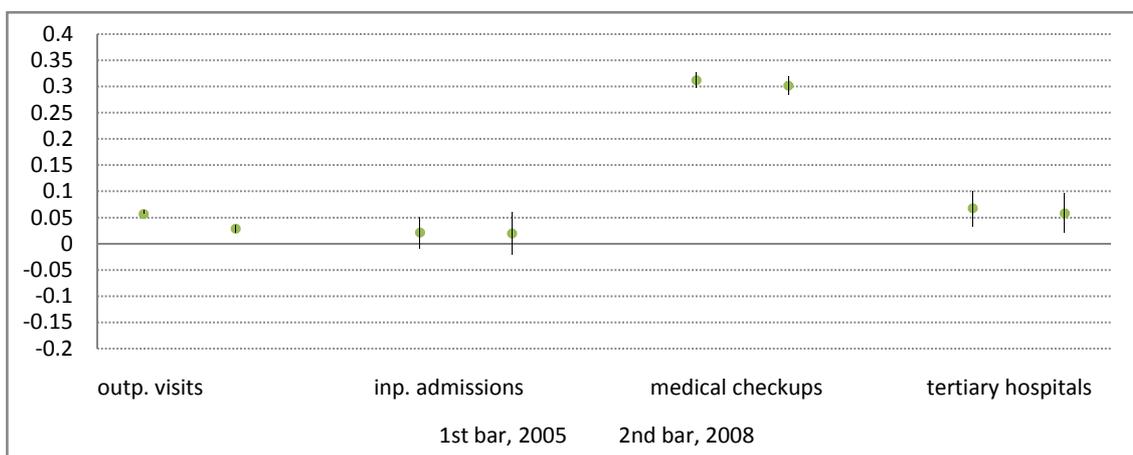
[94] See [Appendix 34] for the income-related concentration curves for health care utilisation (2005 & 2008) in probability.
[95] See [Appendix 40] for the table of changes of income-related inequity indices b/w 2005 & 2008 in probability.

striking inequity change. The directions and degrees of income-related health care utilisation in probability appear not so different between the two years, except outpatient visits-- although the degrees of inequity for both years are tiny.

8.4.3.3 Test of Income-related Inequity Changes Between 2005 and 2008, Probability

This section will describe the statistical test of the income-related inequity changes in probability between 2005 and 2008, using regression analyses. Like the income-related inequity changes in total number, no statistically significant income-related inequity changes in health care utilisation are found between the two years. Based on [Table 8.7], the coefficients of the time and rank interaction term for all types of utilisation show negative values-- which means improved inequity; but the changes are not statistically significant ($p>0.05$). However, as the p-value of outpatient visits is close to 0.05 (0.053), there might be a meaningful inequity changes between the two years like [Figure 8.15] shows. By and large, this result using regression analyses is almost consistent with the EI comparisons with 95% confidence intervals in [Figure 8.15].

[TABLE 8.7] INCOME-RELATED INEQUITY CHANGE B/W 2005 & 2008, PROBABILITY

	Coefficient	P> |t|	Confidence Intervals (95% Level)
Outpatient Visits	-0.0093	0.053	-0.0187 ~ 0.0001
Inpatient Admissions	-0.0047	0.854	-0.0548 ~ 0.0454
Medical Checkups	-0.0057	0.624	-0.0287 ~ 0.0172
Tertiary Hospital visits	-0.0228	0.361	-0.0717 ~ 0.0261

8.5   Changes in Wealth-Related Inequity

8.5.1   Introduction

As explained in the analysis of "Changes in Income-related Inequity," the average volumes of actual health care services-- both in total number and probability-- generally increased, except inpatient days and tertiary hospital visits. Considering health care needs, the distributions of outpatient visits, inpatient admissions and inpatient days are nearly equal while those of medical checkups, health care expenditure and tertiary hospitals show pro-wealthy inequity. For all types of need-standardized health care services, few changes in wealth-related inequity are found between 2005 and 2008-- only for tertiary hospital visits in probability.

8.5.2   Total Number of Health Care Utilisation by Wealth Quintile Groups

8.5.2.1 Need-Standardization of Health Care Utilisation

The impacts of need-standardization of the total numbers of health care utilisation by wealth quintile groups for 2005 and 2008 will be compared in the following section. The distributions of actual health care utilisation for outpatient visits, inpatient admissions and inpatient days are concentrated on the less wealthy, while their need-standardized utilisation is less concentrated in the less wealthy[96]. The changes of the distribution patterns of need-standardized utilisation across the wealth quintile groups do not look significant between the two years. On the other hand, the distributions of both actual and need-standardized medical checkups and health care expenditures are skewed toward the wealthier with increased utilisation volumes in 2008 [Figure 8.16] [Table 8.8].

- The distributions of actual outpatient visits are more concentrated in the less wealthy than those of need-standardized utilisation for both years. The need-standardized outpatient visits are somewhat more concentrated in the lowest wealth quintile group for both years, while the utilisations are relatively equally distributed across the other four wealth quintile groups.

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[96] See [Appendix 17] for the table of health care utilisation change by wealth quintile (2005 & 2008) in total number.

- The distribution of actual inpatient admissions in 2008 is less skewed to the lowest wealth quintile group than the distribution in 2005, while the distributions of need-standardized utilisation for both years do not show any clear patterns.

[FIGURE 8.16] INDIRECTLY NEED-STANDARDIZED HEALTH CARE UTILISATION BY THE WEALTH QUINTILES 2005 & 2008, TOTAL NUMBER

OUTPATIENT VISITS

INPATIENT ADMISSIONS

INPATIENT DAYS
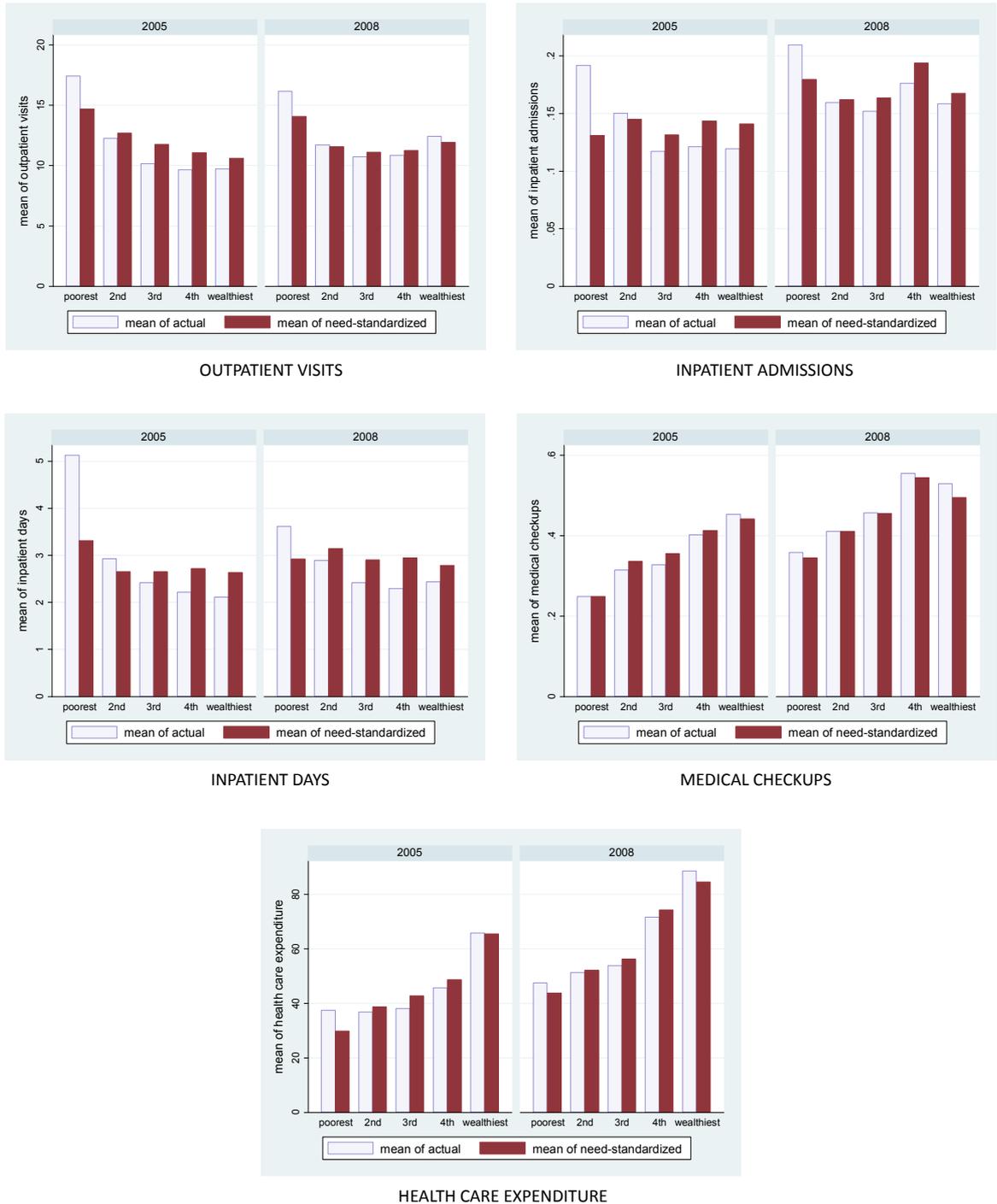
MEDICAL CHECKUPS

HEALTH CARE EXPENDITURE

Classification	2005			2008		
	Poorest	Richest	Ratio	Poorest	Richest	Ratio
Medical Checkups	0.2485	0.4416	180%	0.3450	0.4950	143%
Health Care Expenditure(KRW)	298,144	655,543	220%	437,863	845,567	193%

- The volume of actual inpatient days in 2008 is smaller than and the distribution is clearly concentrated in the less wealthy, particularly on the lowest wealth quintile group in 2005. However, the distributions of need-standardized inpatient days are relatively equally distributed across the wealth quintile groups for both years, particularly in 2008.

- For medical checkups, the distributions of need-standardized utilisation are considerably concentrated in the wealthy quintile groups for both years and there are very little differences in distribution pattern between actual and need-standardized utilisation. The volume of utilisation in 2008 have increased 18% from 2005 with the highest utilisation by the 2nd wealthiest quintile group in 2008, which leads to the extreme group relative inequality ratio lower (143%) than the ratio of 2005 (180%) [Table 8.8].

- Similarly, the distributions of actual and need-standardized health care expenditure are highly skewed to the wealthy for both years with the higher volume of average utilisation in 2008 (140%) [Appendix 17]. As [Table 8.8] shows, the extreme group relative inequality ratios for health care expenditure are somewhat lowered to 193% in 2008 from 220% in 2005; however, the ratios only give pictures of the magnitudes of the health care gaps utilized between the two extreme groups.

8.5.2.2 Wealth-related HIwv Indices, Total Number

The following section will provide wealth-related inequity changes in health care utilisation between 2005 and 2008 with the HI*wv* indices[97] [Figure 8.17].

- The HI*wv* indices for outpatient visits in 2005 and 2008 indicate slightly reduced pro-poor inequity.

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[97] See [Appendix 35] for the wealth-related concentration curves for health care utilisation (2005 & 2008) in total number.
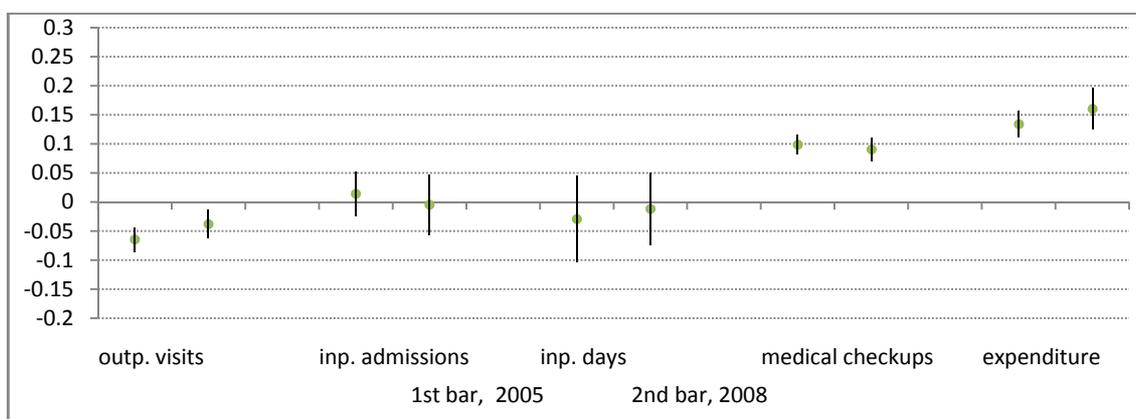
- The HI*wv* index in 2005 indicates slightly pro-wealthy inequity while the index in 2008 shows slight pro-poor wealth-related inequity in the use of inpatient admissions.

- For inpatient days, the HI*wv* indices show slight pro-poor inequity for both years.

- The uses of health care expenditure as well as medical checkups, total number, show considerably pro-wealthy inequity for both years and this is consistent with the income dimension. And as [Figure 8.17] shows, there has been very small improvement of wealth-related inequity in 2008. The HI*wv* index of health care expenditure in 2008 indicates worsened pro-wealthy inequity than the index of 2005.

In summary, there is almost equal or slightly pro-wealthy inequity in the uses of outpatient visits, inpatient admissions and inpatient days in total number. On the other hand, pro-wealthy inequity in medical checkups and health care expenditure are found. Little wealth-related inequity changes in the total numbers of health care utilisation is observed between the two years based on the HI*wv* indices presented.

8.5.2.2 Test of Wealth-related Inequity Changes between 2005 & 2008, Total Number

This section will describe the statistical test of the wealth-related inequity changes, total number, between 2005 and 2008 based on a regression analysis with a time and rank interaction term. As [Table 8.9] illustrates, there are no statistically significant wealth-related inequity changes had been made in the use of any types of health care utilisation

	Coefficient	$P> |t|$	Confidence Intervals (95% Level)
Outpatient Visits	0.0266	0.104	-0.0054 ~ 0.0586
Inpatient Admissions	-0.0185	0.573	-0.0830 ~ 0.0459
Inpatient Days	0.0175	0.723	-0.0792 ~ 0.1142
Medical Checkups	-0.0082	0.540	-0.0345 ~ 0.0181
Health Care Expenditure	0.0262	0.225	-0.0162 ~ 0.0687

between the two years. On a basis of the coefficients of the time and rank interaction term for health care utilisation types [Table 8.9], the positive coefficients of the utilisation with pro-poor inequity (outpatient visits and inpatient days) indicate the inequity change toward the less pro-poor direction while the positive coefficient with pro-wealthy inequity (health care expenditure) indicates the inequity change toward the more pro-wealthy direction. In the same way, the negative coefficients with pro-wealthy inequity (inpatient admissions and medical checkups) mean the reduced pro-wealthy inequity. The changes of wealth-related inequity in health care utilisation in total number explained by the regression coefficients are consistent with the comparison graphs of the HI*wv* indices and their confidence intervals [Figure 8.17]. However, the result is not statistically significant (*p*-values>0.05) [Table 8.9].

8.5.3 Probability of Health Care Utilisation by Wealth Quintile Groups

8.5.3.1 Need-Standardization of Health Care Utilisation

The health care utilisation changes before and after need-standardization as well as the overall utilisation changes between 2005 and 2008 will be described in the following section. The overall volume of the wealth-related health care utilisation in probability for both years had increased-- except in the use of tertiary hospital visits, and the patterns of probability distributions had been somewhat changed between 2005 and 2008[98] [Figure 8.18].

- The actual outpatient visits are nearly evenly distributed across the wealth quintile groups for both years and the need-standardized utilisations are also distributed evenly, as well.

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[98] See [Appendix 18] for the table of health care utilisation change by wealth quintile (2005 & 2008) in probability.

- The probability of using actual inpatient admissions is higher among the wealthiest and the poorest groups for both years while the need-standardized utilisation is almost equally distributed with slightly more concentration on the wealthy.

- For medical checkups, the patterns of actual and need-standardized utilisation are nearly the same between the two years, but the utilisation volume has increased to 133% in 2008 than in 2005. The distributions of need-standardized medical checkups are highly concentrated in the wealthy for both years.

- In case of tertiary hospital visits, the volume of utilisation have somewhat decreased in 2008 and the distribution of utilisation in 2008 appears less concentrated in the wealthy.

[FIGURE 8.18] INDIRECTLY NEED-STANDARDIZED HEALTH CARE UTILISATION BY THE WEALTH QUINTILES 2005 & 2008, PROBABILITY

OUTPATIENT VISITS

INPATIENT ADMISSIONS

MEDICAL CHECKUPS

TERTIARY HOSPITAL VISITS
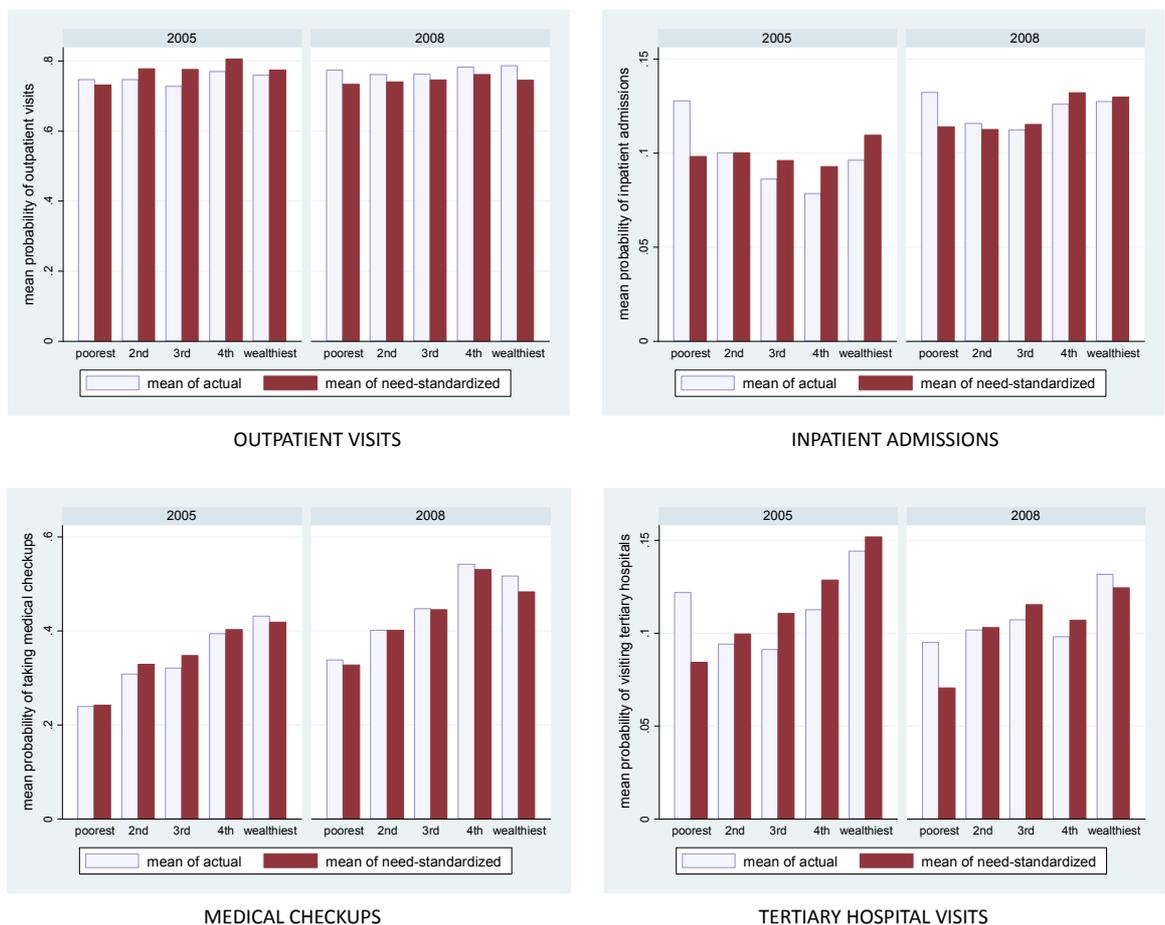
8.5.3.2 Wealth-related Erreygers Concentration Indices Probability

The following section will provide wealth-related inequity in the probability of health care utilisation by the wealth quintile groups with the EIs[99] [Figure 8.19] [Table 8.10].

- The EIs for outpatient visits of the two years indicate almost equal utilisation; however, the index of 2008 is somewhat less pro-wealthy than that of 2005.

- The EIs for inpatient admissions for both years are also quite shows fair utilisation; however, pro-wealthy inequity in 2008 is a bit worsened than in 2005, although the change is very minor.

- For medical checkups, the HIwv indices are considerably pro-wealthy, and the magnitudes of inequity are almost the same (0.1687 in 2005 and 0.1681 in 2008). Compared to the income dimension in probability, the magnitude of pro-wealthy inequity appears much smaller than the income-related inequity for both years.

- In case of the probability of using tertiary hospitals, the EI of 2008 is slightly less favouring to the advantaged than the index of 2005; however, the magnitudes of pro-wealth inequity are moderate [Figure 8.19].

In summary, similar to the income dimension in probability, there is almost no wealth-related inequity in outpatient visits and inpatient admissions and little changes were made between the two years. On the other hand, medical checkups utilized by the wealth quintile

[FIGURE 8.19] COMPARISON OF WEALTH-RELATED ERRYEGERS INDICES B/W 2005 & 2008, PROBABILITY

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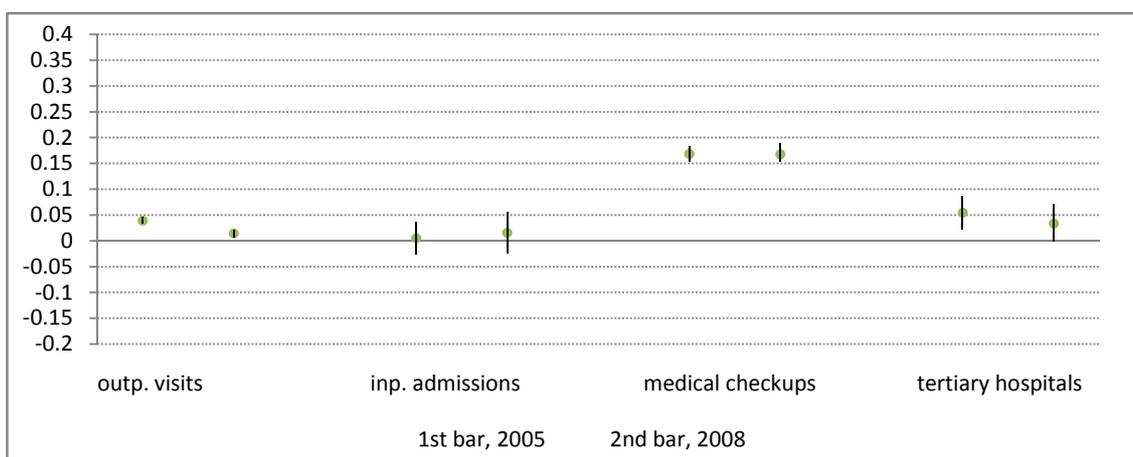
[99] See [Appendix 36] for the wealth-related concentration curves for health care utilisation (2005 & 2008) in probability.

groups show considerably pro-wealthy inequity for both years with similar degrees. Wealth-related inequity in the use of tertiary hospitals show somewhat pro-wealthy for both years, but the magnitude of pro-wealth inequity in 2008 is slightly smaller than that of 2005.

8.5.3.3 Test of Wealth-related Inequity Changes between 2005 & 2008, Probability

The following section will present the statistical test of wealth-related inequity changes between 2005 and 2008 based on the regression method. There is a statistically significant wealth-related inequity change in the use of tertiary hosptial visits. The coefficient of the time and rank interaction term for tertiary hospital visits is -0.0487 with a *p*-value of 0.049, indicating improved (or reduced) pro-wealthy inequity in 2008 [Table 8.10]. The changes of wealth-related inequity for the other utilisation types in probability, on the other hand, are not statistically significant and this result is somewhat consistent with the comparisons of the wealth-related EIs and their confidence intervals in [Figure 8.19].

[TABLE 8.10] WEALTH-RELATED INEQUITY CHANGES B/W 2005 & 2008, PROBABILITY

	Coefficient	P> |t|	Confidence Intervals (95% Level)
Outpatient Visits	-0.0080	0.094	-0.0173 ~ 0.0014
Inpatient Admissions	0.0213	0.412	-0.0297 ~ 0.0723
Medical Checkups	0.0008	0.944	-0.0225 ~ 0.0241
Tertiary Hospital Visits	-0.0487	0.049*	-0.0974 ~ -0.0001

8.6 Changes in Education-Related Inequity

8.6.1 Introduction

Compare with the income and wealth dimensions, both in total number and probability, the distributions of actual health care utilisation across the education groups are more skewed to the least educated for outpatient visits, inpatient admissions, inpatient days, health care expenditure and tertiary hospitals while the distributions of medical checkups are considerably more concentrated in the more educated for both years. However, after health care needs are standardized, the overall skewness of the health care distributions toward the extreme groups has been considerably reduced and some noteworthy changes in education-related inequity are observed between 2005 and 2008.

8.6.2 Total Number of Health Care Utilisation by Education Groups

8.6.2.1 Need-Standardization of Health Care Utilisation

This section will describe the changes of utilisation and its distributions across the education groups between 2005 and 2008[100] [Figure 8.20].

- According to [Figure 8.20], there is a steep gradient on the distribution of actual outpatient visits toward the lowest education group in 2008, which is the similar pattern of the distribution but a slightly increased volume of utilisation in 2005. On the other hand, the distributions of need-standardized outpatient visits are quite moderate with somewhat more concentrated in the less educated.

- For inpatient admissions, actual health care utilisation is heavily concentrated in the lowest and the 2nd lowest education groups for both years. However, the need-standardized inpatient admissions are more distributed on the more educated in 2005 while the less educated, particularly the 2nd lowest education group, utilized more health care in 2008.

- In case of inpatient days, actual health care utilisation is highly skewed toward to the lowest and the 2nd lowest education groups for both years. Interestingly, the need- standardized utilisation across the education groups for both years looks

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[100] See [Appendix 19] for the table of health care utilisation change by education group (2005 & 2008) in probability.

[FIGURE 8.20] INDIRECTLY NEED-STANDARDIZED HEALTH CARE UTILISATION BY THE EDUCATION GROUPS 2005 & 2008, TOTAL NUMBER

OUTPATIENT VISITS

INPATIENT ADMISSIONS

INPATIENT DAYS

MEDICAL CHECKUPS

HEALTH CARE EXPENDITURE
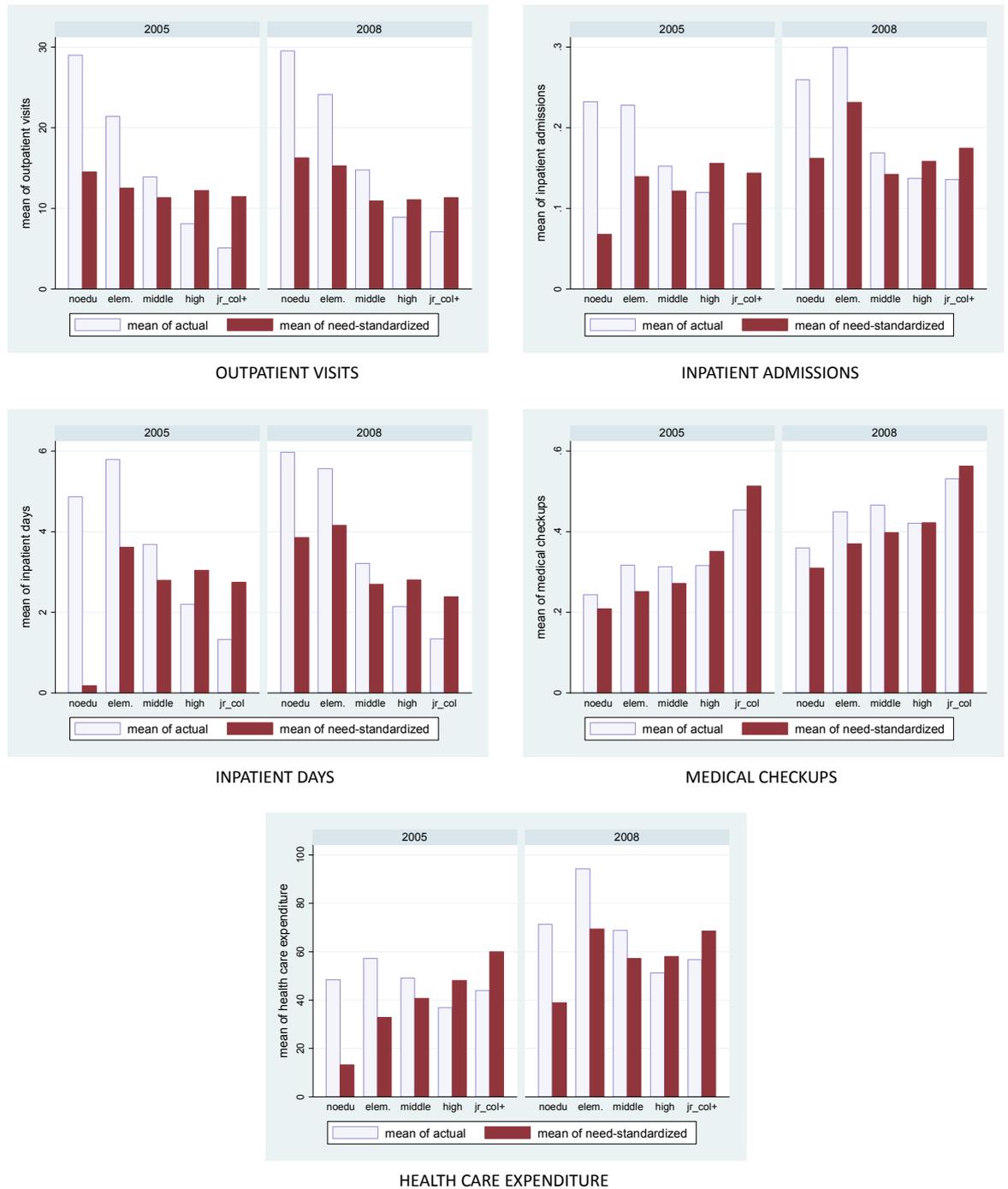
[TABLE 8.11] CHANGES IN THE EXTREME GROUP RELATIVE INEQUALITY RATIOS B/W 2005 & 2008, MEDICAL CHECKUPS & HEALTH CARE EXPENDITURE, TOTAL NUMBER (EDUCATION)

Classification	2005			2008		
	Poorest	Richest	Ratio	Poorest	Richest	Ratio
Inpatient Admissions	0.0677	0.1560	230%	0.1621	0.1744	108%
Inpatient Days	0.1746	2.7413	1,570%	3.8545	2.3890	62%
Medical Checkups	0.2088	0.5134	245%	0.3093	0.5628	182%
Health Care Expenditure(KRW)	131,822	599,931	455%	398,682	685,282	176%

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similar-- more concentrated in the less educated, except the health care utilized by the lowest education (no education) group in 2005. Although the actual inpatient days utilized by the lowest education group in 2005 is 4.8652 days, the need standardized utilisation is 0.1746 days, which is almost 28 times lower utilisation after need standardization [Appendix 19]. As explained earlier, the need factors, in particular age, SAH, disease, disability and chronic conditions, are heavily concentrated in the low education groups, but the need distributions between the two years are not meaningfully different to make such a huge gap of utilisation before and after standardization. Therefore, it can be assumed that there may be: 1) a data problem caused by panel attrition (of the aged who have higher health care needs) with pooled data for the two years; or 2) policy changes that encourage the lowest education group to access health care services more properly in relation to "inpatient days."

- Like other SES dimensions, the distributions of medical checkups across the education groups for both years are skewed to the more educated with the increased volume of utilisation, but the lowered extreme group relative inequality ratio (245% to 142%) in 2008 [Table 8.11].

- In case of health care expenditure, the actual expenditure is more spent by the low education groups, particularly in 2008, and the need-standardized expenditure is more spent by the more educated in 2005; while the 2nd lowest (elementary school graduation) and the highest (junior college or higher) education group spent more on health care than other education groups in 2008. The extreme group relative inequality ratios for health care expenditure are sharply reduced to 176% in 2008 from 455% in 2005 [Table 8.11].

8.6.2.2 Education-related HIwv Indices, Total Number

The following section will describe the education-related inequity and its changes between 2005 and 2008 with the HI*wv* indices[101] [Figure 8.21].

- For outpatient visits, the HI*wv* index of 2005 is slightly pro-disadvantaged and the index of 2008 is somewhat more pro-disadvantaged.

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[101] See [Appendix 37] for the education-related concentration curves for health care utilisation (2005 & 2008) in total number.

- The HI*wv* indices of inpatient admissions for the two years show opposite directions; somewhat pro-advantaged inequity in 2005 and slight pro-disadvantaged inequity in 2005. The HI*wv* indices of inpatient days also show opposite directions with the considerable magnitudes of inequity.

- There is a large education-related inequity gap in the use of inpatient days between 2005 and 2008; quite pro-low educated inequity in 2008 from somewhat pro-educated inequity in 2005.

- The concentration curves of medical checkups and health care expenditure indicate pro-educated inequity with the changed magnitudes between the two years [Appendix 37]. For medical checkups, the HI*wv* index of 2008 is 0.1158 which is somewhat reduced pro-educated inequity in 2005 (HI*wv* index = 0.1528). Education-related inequity in the use of health care expenditure in 2008 shows more reduced pro-advantaged inequity with the HI*wv* index of 0.0409 than the index of 0.1298 in 2005.

In summary, compared to the other SES dimensions, considerable education-related inequity changes are observed across all health care service types between the two years in the less educated (improved) direction.

[FIGURE 8.21] COMPARISON OF EDUCATION-RELATED HI*wv* INDICES B/W 2005 & 2008, TOTAL NUMBER
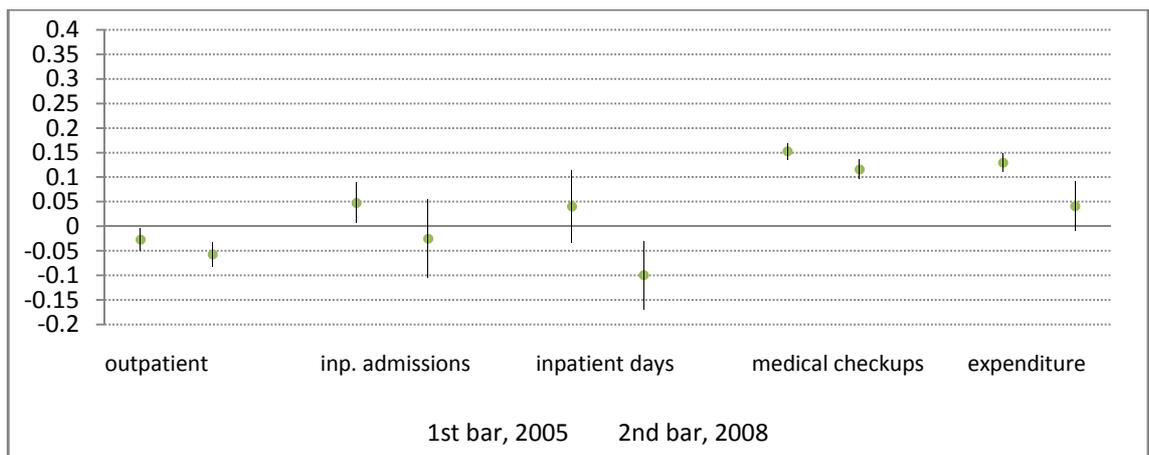
8.6.2.3 Test of Education-related Inequity Changes between 2005 & 2008, Total Number

The statistical test of education-related inequity changes between 2005 and 2008 will be

	Coefficient	P> |t|	Confidence Intervals (95% Level)
Outpatient Visits	-0.0289	0.077	-0.0610 ~ 0.0032
Inpatient Admissions	-0.0698	0.112	-0.1558 ~ 0.0162
Inpatient Days	-0.1347	0.007*	-0.2320 ~ -0.0373
Medical Checkups	-0.0355	0.004*	-0.0598 ~ -0.0112
Health Care Expenditure	-0.0853	0.001*	-0.1368 ~ -0.0338

presented with a regression method. Unlike other SES dimensions, in total number, statistically significant changes in education-related inequity are found among the most types of health care utilisation between the two years. As [Table 8.12] indicates, education-related inequity in the uses of inpatient days, medical checkups and health care expenditure has been changed significantly with the *p*-values less than 0.05. In particular, the inequity change in the use of inpatient days is remarkable with the large coefficient of the time and rank interaction term, which is -0.1347 (*p*-value = 0.007) [Table 8.12]. This means that pro-educated inequity has been changed to the less pro-educated inequity direction, event to pro-less educated; the HI*wv* index of 0.0408 in 2005 to the index of -0.0995 in 2005 [See Appendix 39]. Education-related inequity in the use of medical checkups has a negative coefficient of -0.0355 (*p*-value = 0.004), meaning somewhat reduced pro-educated inequity in 2008 [Table 8.12]. In the same way, a significant inequity change in spending health care expenditure is also observed in the direction of less pro-educated with the negative coefficient of -0.0853 (*p*-value = 0.001). However, education-related inequity changes in the uses of outpatient visits and inpatient admissions are not statistically significant. In addition, this result is consistent with the comparison of HI*wv* indices with their confidence intervals displayed in [Figure 8.21].

8.6.3   Probability of Health Care Utilisation by Education Groups

8.6.3.1 Need-Standardization of Health Care Utilisation

The following section will describe the changes of the utilisation probability and its distribution before and after need-standardization between 2005 and 2008[102]. The probability distributions of actual outpatient visits, inpatient admissions and tertiary hospital visits across the education groups are more concentrated in the less educated while

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[102] See [Appendix 38] for the education-related concentration curves for health care utilisation (2005 & 2008) in probability.

the distributions of the need-standardized health care, in probability, are almost equal (outpatient visits), somewhat pro-advantaged/pro-disadvantaged (inpatient admissions) or clearly pro-advantaged (tertiary hospital visits), and the distribution patterns are somewhat different between 2005 and 2008. On the other hand, the distributions of both actual and need-standardized medical checkups, in probability, are considerably concentrated in the more educated, and the average probability as well as the distribution pattern appears different between the two years [Figure 8.22].

[FIGURE 8.22] INDIRECTLY NEED-STANDARDIZED HEALTH CARE UTILISATION BY THE EDUCATION GROUPS, 2005 & 2008, PROBABILITY

OUTPATIENT VISITS

INPATIENT ADMISSIONS

MEDICAL CHECKUPS

TERTIARY HOSPITAL VISITS
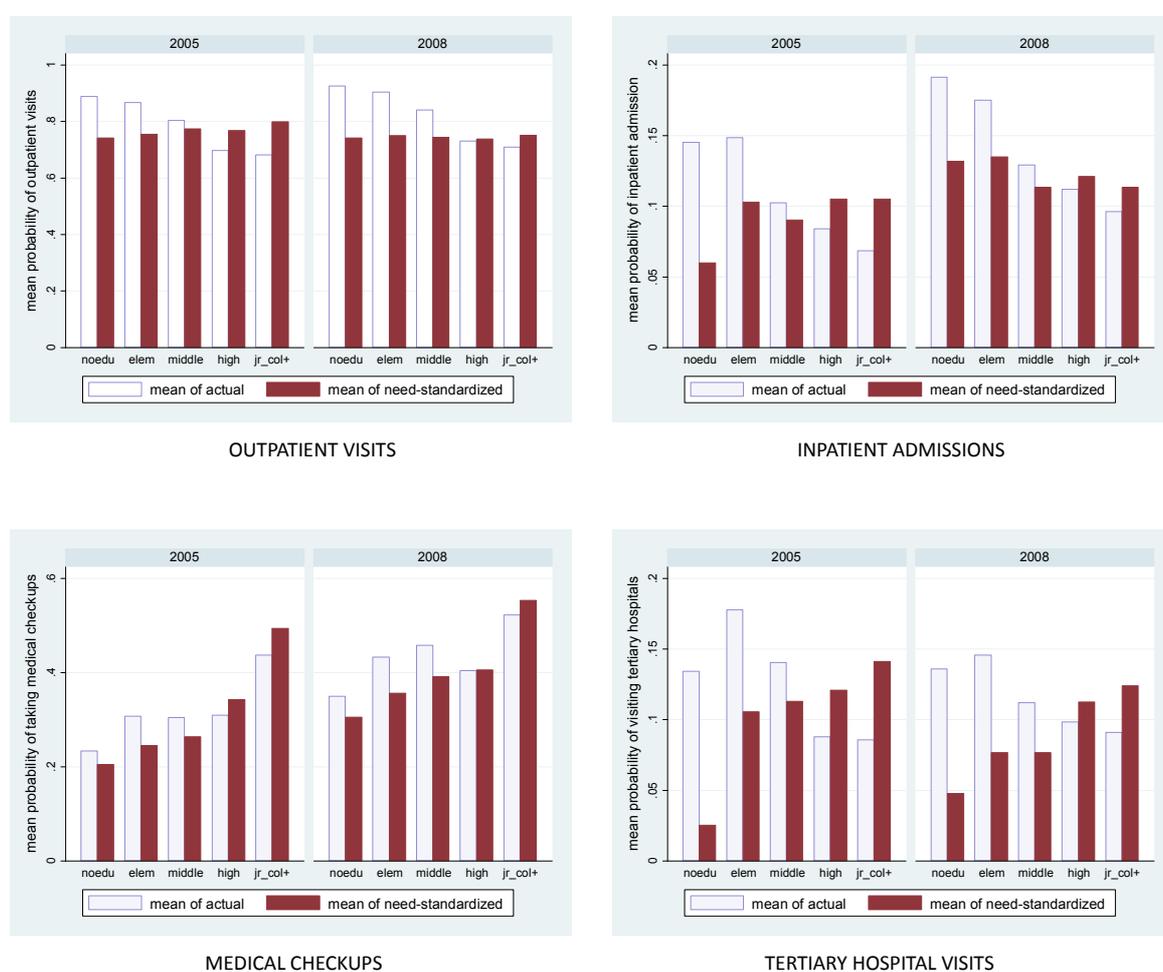
[TABLE 8.13] CHANGES IN THE EXTREME GROUP RELATIVE INEQUALITY RATIOS B/W 2005 & 2008, MEDICAL CHECKUPS & HEALTH CARE EXPENDITURE, PROBABILITY (EDUCATION)

Classification	2005			2008		
	Poorest	Richest	Ratio	Poorest	Richest	Ratio
Medical Checkups	0.2047	0.4938	241%	0.3054	0.5532	181%
Tertiary Hospital Visits	0.0252	0.1412	560%	0.0478	0.1240	259%

- In particular, the distribution change for inpatient admissions is outstanding between the two years. For inpatient admissions, while the probability distributions of actual inpatient admissions are considerably more concentrated on the low education groups for both years, the directions of need-standardized utilisation are opposite for the two years. In 2005, the probability distribution of need-standardized inpatient admissions is more concentrated in the more educated, while the distribution is skewed toward the less educated in 2008.

- In case of tertiary hospital visits, the probability distributions of need-standardized utilisation are concentrated in the more educated while the actual utilisation is sharply distributed to the less educated for both years. The extreme group relative inequality ratios had been noticeably changed from 560% in 2005 to 259% in 2008, meaning less sharply skewed to the educated in 2008 [Table 8.13].

8.6.3.2 Education-related Erreygers Concentration Indices, Probability

This section will explain education-related inequity changes between 2005 and 2008 in the probability of health care utilisation with the EIs[103] [Figure 8.23].

- For outpatient visits, the EIs for both years are almost equal (0.0439 & 0.0070); however, the inequity shows some improvement in 2008.

- The EIs for inpatient admissions seem to be changed between the two years, indicating small pro-disadvantaged inequity in 2008 from somewhat pro-advantaged inequity in 2005.

- The EIs for medical checkups indicate large pro-educated inequity with some degrees of inequity changes between the two years. The EI for medical checkups in 2008 (0.2018) is somewhat reduced pro-educated inequity from 2005 (0.2616).

- The EI for tertiary hospitals for both years indicate slight pro-educated inequity and there is almost no inequity change between the two years.

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[103] See [Appendix 38] for the education-related concentration curves for health care utilisation (2005 & 2008) in probability.
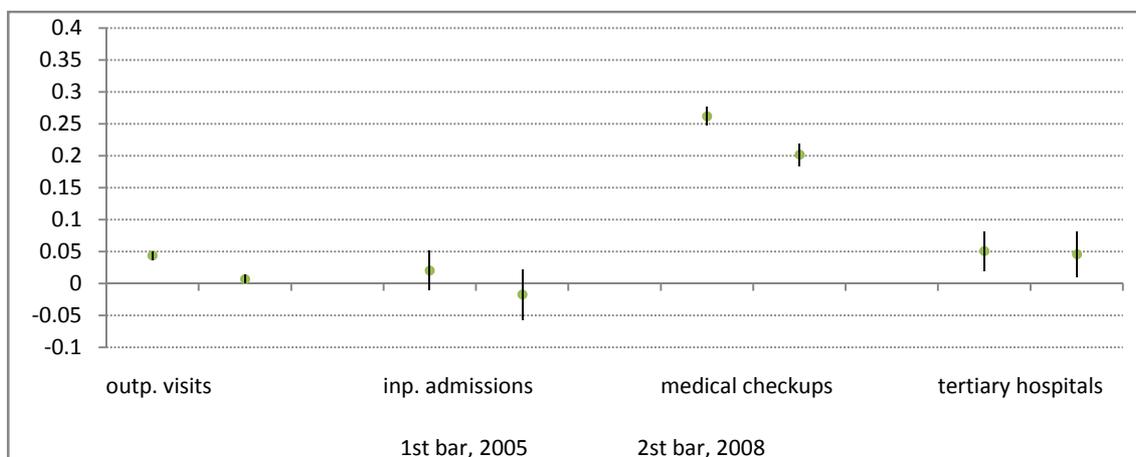
In summary, on the basis of the EIs presented in this section, almost equal or slight pro-educated utilisation have been made for outpatient visits, inpatient admissions and tertiary hospital visits, while considerable education-related inequity is observed in the uses of medical checkups. In addition, the magnitudes of inequity have been changed in the direction of less-educated across the utilisation types.

8.6.3.3 Test of Education-related Inequity Changes between 2005 & 2008, Probability

The following section will present the result of he statistical test of education-related inequity changes between 2005 and 2008 with a regression method. Between 2005 and 2008, there are statistically significant changes on education-related inequity in the utilisation probability of outpatient visits, inpatient admissions and medical checkups, while no statistically significant change is found in the use of tertiary hospital visits. The coefficient of the time and rank interaction term for outpatient visits is -0.0098 (p-value = 0.037) although the difference is very small in the direction of less pro-educated [Table 8.14]. There are also considerable education-related inequity changes in the direction of less pro-educated between the two years with the coefficients of -0.0658 (p-value = 0.01) for inpatient admissions and -0.03 (p-value = 0.01) for medical checkups [Table 8.14]. There is no education-related inequity change in the use of tertiary hospital visits for both years. And this result is almost consistent with the comparison of the HIwv indices with the confidence intervals shown in [Figure 8.23].

[TABLE 8.14] EDUCATION-RELATED INEQUITY CHANGE B/W 2005 & 2008, PROBABILITY

	Coefficient	P> |t|	Confidence Intervals (95% Level)
Outpatient Visits	-0.0098	0.037*	-0.0190 ~ -0.0006
Inpatient Admissions	-0.0658	0.010*	-0.1161 ~ -0.0154
Medical Checkups	-0.0300	0.010*	-0.0529 ~ -0.0071
Tertiary Hospital Visits	-0.0194	0.417	-0.0663 ~ 0.0275

8.7 Summary & Discussions

8.7.1 Summary of Findings

The major findings of the second empirical chapter on "equity change in health care utilisation across the three SES dimensions between 2005 and 2008 in Korea" can be summarized as below:

After health care needs are standardized,

- *There is no statistically significant income- related inequity change in health care utilisation, both in total number and probability, between 2005 and 2008.*

- *There is almost no statistically significant wealth-related inequity change in health care utilisation, except in tertiary hospital visits in probability, between 2005 and 2008.*

- *Statistically significant education-related inequity is found*

  - *in the uses of inpatient days, medical checkups and health care expenditure in total number*

  - *in the uses of outpatient visits, inpatient admissions, and medical checkups in probability*

- *The statistically significant inequity changes in health care utilisation consistently show some improvement, indicating somewhat less pro-advantaged or even pro-disadvantaged in 2008 [Table 8.15].*

[TABLE 8.15] STATISTICALLY SIGNIFICANT INEQUITY CHANGES IN HEALTH CARE UTILISATION B/W 2005 & 2008

SES Dimension	Measure	Utilisation Type	Coefficient	Inequity Direction
Wealth	Probability	Tertiary hospital visits	-0.0487	Improved (less pro-advantaged)
Education	Total number	Inpatient days	-0.1347	Improved (less pro-advantaged)
		Medical checkups	-0.0355	Improved (less pro-advantaged)
		Health care expenditure	-0.0853	Improved (less pro-advantaged)
	Probability	Outpatient visits	-0.0098	Improved (less pro-advantaged)
		Inpatient admissions	-0.0658	Improved (less pro-advantaged)
		Medical checkups	-0.0300	Improved (less pro-advantaged)

8.7.2 Discussions on Inequity in Health Care and Policy in Korea

8.7.2.1 Income and Wealth Dimensions

With regard to the SES-related inequity changes between 2005 and 2008, most of the statistically significant changes are found with the education dimension and the changes involve something different from the income and wealth dimensions. For this reason, the education-related inequity changes will be dicussed separately after discussiong the inequity changes with the income and wealth dimensions.

For outpatient visits, in total number and probability, there have been little changes in income and wealth-related inequity between 2005 and 2008, showing almost equal or pro-disadvantaged inequity. This implies that outpatient visits are more likely to be utilized by health care needs than the income and wealth status in Korea and the health care policy as well as the health care environment changes between the two years have not affected significantly on the uses of outpatient visits.

In case of inpatient care (both admissions and days), certain degrees of the income and wealth-related inequity changes are observed although the inequity changes do not show any clear patterns or statistical significance. As explained in the result section, the actual inpatient admissions and inpatient days are utilized much more by the disadvantaged in accordance with their higher health care needs; however, after health care needs are standardized, the tendancy of pro-disadvantaged inequity have been much moderated to sligtly pro-disadvantaged or pro-advantaged. In relation to the equity changes in the uses of inpatient care, further studies are needed to find more reliable and sophisticated effects of the policies or changed environment involved, such as the benefit expansion and the growh of private health insurance, with detailed health care utilisation data recorded by providers or the insurer-- not a household survey data. Up to date, the relevant studies found mixed results of the effectiveness of the health care policy and environment changes on the frequency as well as length of inpatient care utilisation (Kim, Choi, & Lee, 2008; Liu et al., 2012; You, Kang, Kwon, & Oh, 2011).

Medical checkups in this analysis encompass private medical examinations for the purposes of prevention/diagnosis as well as biennial national (public) medical checkups. According to the National Health Screening Statistical Yearbook (2008), 65.31% of the total target examinees have received national medical examinations in 2008, which is a very high rate;

but the gap of the rates of taking examinations between the highest income quartile group and the lowest income quartile group was 20.5% (Cho & Lee, 2011). Also, luxury medical checkups which are provided by the private sectors are getting more popular in Korea (Cho & Lee, 2011) via private health insurance or out-of-pocket paymets and this may lead the medical checkups to be utilized in accordance with the income and wealth status, not with health care needs. Relevant studies report that two thirds (64%) of the total population of Korea have at least one private health insurance policy and the policy holders are more likely to be aged 40s to 50s, educated and healthy (Yoon et al., 2005; You, Kang, Oh, & Kwon, 2010; Yun, 2008). In addition, high pro-advantaged inequity in the use of medical checkups may also bring about inequity in health outcomes because people who are able to purchase private health insurance plans or to have time and information for taking medical checkups will have more opportunity to prevent or detect problematic diseases in advance.

The actual health care expenditure is more utilized by people with higher health care needs-- low income and high wealth quintile groups; however, after health care needs are standardized, higher income and wealthier quintile groups spend much more for both years. Although the health care expenditure have remarkably increased to 37% from 2005 to 2008, compared to the increase of the health care price index (5.7%) in Korea during the same period of time [Table 8.16] (Ministry of Health and Welfare, 2013; Statistics Korea, 2012b), the magnitudes of pro-rich/pro-wealthy inequity in health care expendure have not been reduced. The one of important reasons why health care expenditure shows high pro-advantaged inequity with increased finance is considerable financial barriers for the disadvantaged in Korea, in forms of various uncovered services with high OOP payments. This may limit people with low socioeconomic status to access appropriate health care services, while people with higher socioeconomic status are capable to utilize those services without any gatekeeping process.

[TABLE 8.16] GROWTH OF HEALTH CARE EXPENDITURE AND HEALTH CARE PRICE INDEX

	2005	2006	2007	2008	Growth
Health care expenditure (per capita, US$, PPP)	1,282	1,480	1,667	1,758	37%
Health care price index	90.965	92.754	94.369	96.188	5.7%

Source: Ministry of Health and Welfare (2013); Statistics Korea (2012b)

For tertiary hospital visits, the probability of visits in 2008 is somewhat lower than in 2005 and indicating less pro-advantaged inequity in 2008. This may be due to the coverage expansion for patients with cancers and severe diseases (coinsurance have been reduced from 20% to 10% in late 2005) between the two years. The coverage expansion probably enables the lower income or wealth groups with severe diseases to utilize higher level of health care institutions (tertiary hospitals) and this may result in reduced pro-advantaged inequity in the use of tertiary hospitals. The reduced inequity in the use of tertiary hospital visits is significant with the wealth dimenstion, particualarly. Like the case of health care expenditure, the actual use of visiting tertiary hospitals in probability is made in accordance with health care needs rather than the socioeconomic status; however, the need-standardized tertiary hospital visits also indicate pro-advantaged inequity.

8.7.2.2 Educational Dimension and Some Methodological Issues

Among the inequity changes of the three SES dimensions, the education-related inequity changes show unusual characteristics to be discussed separately from the other dimensions. Compared to the distributions of all types of health care needs with the income and wealth dimensions, the distributions with the education dimension are more highly concentrated in the lower education group and the gradient is very steep. Among the health care needs proxied in this study, age is the most strongly correlated with the level of education; the mean age of the lowest education group is 73.33 in 2008, which is almost 30 years gap from the mean age of the highest education (43.84) [Table 8.17]. On the other hand, the mean ages of the lowest income and wealth quintile groups are 66.6 and 55.12, and the gaps from the highest income and wealth quintile groups are 19.09 and -1.88, respectively. Due to the high concentration of the health care needs in the lower education groups, all types of actual health care services, except medical checkups, are more utilized by the lower educated groups with strong pro-less educated inequity. However, after health care needs are standardized, the magnitudes and directions of inequity have been moderate and vary by type of health care services.

In case of inpatient care, health care expenditure and tertiary hospital visits, there have been relatively large education-related inequity changes beteween 2005 and 2008. In particular, the need-standardized health care utilisation of the lowest education group in 2005 is very low compared to the actual utilisation for the same year while the much reduced gaps are found between the actual and need-standardized utilisation in 2008. This leads to

remarkably improved (less pro-educated or pro-less educated) inequity in 2008. It is assumed that the higher sample attrition of the lowest education group (34.4%) may reduce a certain number of aged people who have higher health care needs and usually utilize health care services more intensly [Table 8.17]. Compared to the other education groups, the attrition rate of the lowest education group is the highest and the mean age gap between 2005 and 2008 (for 3 years) is only 1.31, and this enables the need-standardized utilisation of the lowest education group reasonably higher in 2008.

The strong correlation between age and the educational status and the unbalanced sample attrition also affect other types of health care utilisation with the education dimension, which probabily result in more robust inequity changes between the two years than the other SES dimensions in this study. Therefore, the current classification method of education, which does not reflect the real differences of educational attainment with a form of grouped data, together with the historical background of education attainment in Korea, as addressed in Chapter 7, has a limit to capture the magnitude of inequity in health care utilisation in a comparable manner like those of the income and wealth dimensions with continuous variables.

There are, however, pro-educated inequity is consistently found in the use of the actual and need-standardized medical checkups, in total number and probability, for both years, like the other SES dimensions. It means that medical checkups in Korea are utilized by socioeconomic status, not by health care needs; although the statistically significant change has been found with the education dimension only.

[TABLE 8.17] MEAN AGE AND SAMPLE ATTRITION RATES OF EDUCATION GROUPS

Education Group	Mean Age			Attrition Rate (%)
	2005	2008	difference	
Lowest	72.02	73.33	1.31	34.40
2n Lowest	62.74	64.97	2.23	21.24
Middle	55.12	57.80	2.68	20.16
2nd Highest	44.94	46.88	1.94	18.28
Highest	41.90	43.84	1.96	15.57

8.7.3 Conclusions

It is difficult to define the causes and contributing factors of the SES-related inequity changes from the analysis method this study employs. However, it is assumed that the benefit coverage expansion policy[104] and the rapid growth of the private health insurance[105] market in Korea may play major roles in changing utilisation patterns of each SES group together with the general health care environment changes, such as prompt introduction of new health technologies[106] and increasing attention to health and health care by the general public, like other high income countries. However, existing studies of the effects of benefit coverage expansion and private health insurance on the volume of utilisation or inequity have suggested mixed findings (Cho et al., 2010; S. Kang et al., 2009b; Kim et al., 2008c; Kondo & Shigeoka, 2012; Liu et al., 2012; Yun, 2008). And some studies also conclude that the magnitudes and directions of changes in volumes and equity in health care utilisation are subject to each country's health care system (Biro, 2011; Liu et al., 2012). In case of Korea, the rencent benefit coverage expansion policy on top of fee-for-service payment without any gatekeeping system may essentially increase the volume of utilisation. In addition, the rapid growth of private health insurance may serve as an incentive to use more health care services which are not covered by KNHI, as well. Maybe the overall volume increase of health care utilisation also includes the utilisation by the low socioeconomic groups' unmet health care needs, which is quite desirable. However, the important point to be discussed in the study is that the recent changes of health care policy and environments may contribute to the increase of the total volume of the services utilized and this may lead to fairly equal utilisation of some health care services generously covered by KNHI-- outpatient and inpatient services. But the health care services with quality and intensity have still remained considerably pro-advantaged inequity probabily due to financial barriers.

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[104] See [Table 8.2] for the list of the major items of expanded benefit coverage between 2005 and 2008.
[105] Private health insurance plans in Korea usually covers the non-covered services as well as the coinsurance of the covered services by KNHI.
[106] In general, there is a long time lag between introduction of new health technologies in practice and their benefit coverage, so that the new health technologies may be available as forms of uncovered services to people with the ability to pay for the expensive services.

Chapter 9: Conclusions

9.1   Overall Summaries and Conclusions

Overall Summaries

This study hypothesized whether 1) SES-related inequity in health care utilisation in Korea still exists; 2) inequity in health care utilisation varies by different socioeconomic dimension (income, wealth and education); and 3) SES-related inequity in health care utilisation has been changed between 2005 and 2008.

First, socioeconomic inequity in health care utilisation is found in accordance with the level of KNHI benefit coverage in Korea. The health care services covered rather comprehensively by the KNHI, e.g. outpatient visits, inpatient admissions and inpatient days, are utilized equally-- or slightly pro-advantaged/disadvantaged-- in accordance with health care needs. On the other hand, the health care services not (or only very limitedly) covered by KNHI, e.g. medical checkups, health care expenditure and tertiary hospitals, show pro-advantaged inequity in health care utilisation, meaning the health care services are utilized in accordance with the patients' socioeconomic status, rather than their health care needs.

Second, inequity in the uses of outpatient visits, inpatient admissions and inpatient days is slightly pro-advantaged/disadvantaged for all three SES dimensions with different degrees. Inequity in the uses of medical checkups, health care expenditure and tertiary hospital visits is considerably pro-advantaged across all three SES dimensions.

Third, the educational inequity changes in health care utilisation between 2005 and 2008 are statistically significant in most of the health care services, both in total number and probability. The changes may come from the strong correlation between age and education level, so that further studies are needed to elucidate actual improvement of inequity in relation to educational status in health care utilisation. However, there are almost no inequity changes between the two years with the income and wealth dimensions, except for utilizing wealth-related tertiary hospital visits in probability.

Three Socioeconomic Dimensions

The phenomenon of SES-related inequity in health care utilisation in Korea led by each country's health care delivery system as well as level of benefit coverage is consistent with the study results among European and Asian countries (Lu et al., 2007; van Doorslaer & Masseria, 2004). However, certain aspects of the phenomenon should be considered for extended studies with various socioeconomic dimensions in explaining inequity in health care utilisation. First, income is indeed a critical socioeconomic factor in deciding health care together with health care needs of individuals, in particular, in a system with a high out-of-pocket payment ratio like Korea. Therefore, the trend of income-related inequity changes should be kept track for proper policy interventions.

Second, compared to the studies of income-related inequity in health care utilisation, wealth-related inequity studies have rarely been conducted. For certain studies of inequity in health care utilisation for the aged, wealth is used for a proxy indicator of income as the elderly population are mostly retired without regular incomes (Allin et al., 2009). Abundant studies suggest that the level of income is not closely related to the level of wealth and inequality of wealth is much larger than that of income, in general (Lee, 2010; Nam, 2009; OECD, 2008). In addition, the distribution of wealth varies across age groups, particularly in younger age groups in Korea due to the relatively early succession of property from the parents. This enables younger people with average incomes but higher wealth transferred from their parents to spend more on their health along with the increased disposable incomes than the peer groups with the similar income. Therefore, it is meaningful to employ 'wealth' as an important socioeconomic dimension in measuring within the same age group inequity in health care utilisation.

Third, although education is one of the very important dimensions in health care utilisation (Choo et al., 2007; Chun et al., 2007; Chun & Kim, 2007), some factors should be considered in order to measure inequity in terms of education. First of all, at present, education is highly negatively correlated with age, as explained in Chapter 8, and the classification of educational attainment is not updated to correctly reflect the changed educational environment in Korea. In additions, high attrition among the elderly group in 2008 may distort the analysis results together with the age-education correlation. Therefore, the statistically significant inequity changes in certain health care utilisation with the

education dimension this study found may not be sensitive to the true inequity in relation to the educational gradient in Korea without consistent results supported by further studies.

Health Care System and Inequity in Health Care Utilisation in Korea

As explained in Chapter 4, the main characteristics of KNHI are universal population coverage with a moderate level of benefit coverage. Although the Korean government has made an effort to expand benefit coverage to quality health care during the last decade, the benefit coverage has still focused on the mild cases and most common conditions the majority of population would experience. Therefore, people with low socioeconomic status have been able to utilize more health care services without an official gatekeeping system. This probably leads to the higher volumes of health care utilisation in general; however, the health care services that entail high out-of-pocket payment may not be accessible to the low SES groups. For that reason, KNHI is highly equitable in a limited number of health care services, but may lack comprehensive coverage that meets all essential health care needs.

KNHI is mostly financed by the insurance premiums collected from the insured (general public) and the government provides minimal health care financing. The government's main role is to contain prices and control physician fees. This encourages health care providers that are owned mostly by the private sector, to create more luxury but uncovered health care services in order to make up for lost income or maximize profits. The uncovered luxury services not only include unnecessary cosmetic or beauty surgeries but also advanced health technologies closely related to the quality of life. As a result, KNHI does not serve as a means of equitable health care utilisation in some areas of services described above.

In addition, health care not properly rationed by professional judgment based on health care needs also brings about inefficient utilisation of health care in forms of overuse, underuse or misuse of medical services. This means that equity in health care utilisation can be achieved through efficient health care resources as well as coverage expansion.

One important fact should be addressed in the conclusion section is widening inequality in income in Korea due to the recent global economic crisis and neo-liberal economic policy by the government. As explained in the empirical analysis chapters, health care needs are highly concentrated in the lower SES groups in Korea, who have limited access to

appropriate quality health care and this may lead to unequal health inequity causing a vicious circle of health and health care inequity in relation to socioeconomic status. Therefore, policy interventions for improving inequity in health care utilisation should be designed in coordination with relevant socioeconomic dimensions for optimizing the policies.

9.2   Policy Implications

Based on the issues of inequity in health care utilisation in Korea discussed in the conclusion section, some policy recommendations relevant to improving inequity will be made in this section. Policies to improve inequity in health care, of course, are interconnected with the overall health care reform in Korea; however, this section will lay emphasis on the most related policies.

First, it is important to increase the public financing share of total health expenditure as well as the absolute amount in order to expand benefit coverage more comprehensively and to set rational physician fees. As mentioned, the lower ratio of public health care spending to GDP in Korea (6.9%, 2011) than that of the average OECD countries (9.6%) has brought about a long national discussion for finding additional sources of the KNHI finance. The increased insurance fund should primarily be allocated for expanding benefit coverage and reducing out-of-pocket payments which have been served as an important financial barrier to equal treatment for equal need as Kim & Yoe (2013) highlights in their recent study. This is quite consistent with the results of the present study which show high inequity in the use of intensive quality health care services for the less advantaged. Therefore, the suggestion mentioned above may include increase the ratio of public health care providers in Korea. As described in Chapter 4, the ratio of private health care institutions in Korea is about 94% (out of the total number health care institutions) and the recent governments have allowed to establish private 'for-profit' health care organizations, although the new policy will be applied to a limited special district at this moment [Appendix 3]. Given market-oriented characteristics of the health care system in Korea, more prudent policy implementation is needed on the basis of the thought of the program contributors (the general public).

[FIGURE 9.1] COMPARATIVE PRICE LEVEL (INDEX) BY SERVICE CATEGORY, 2007
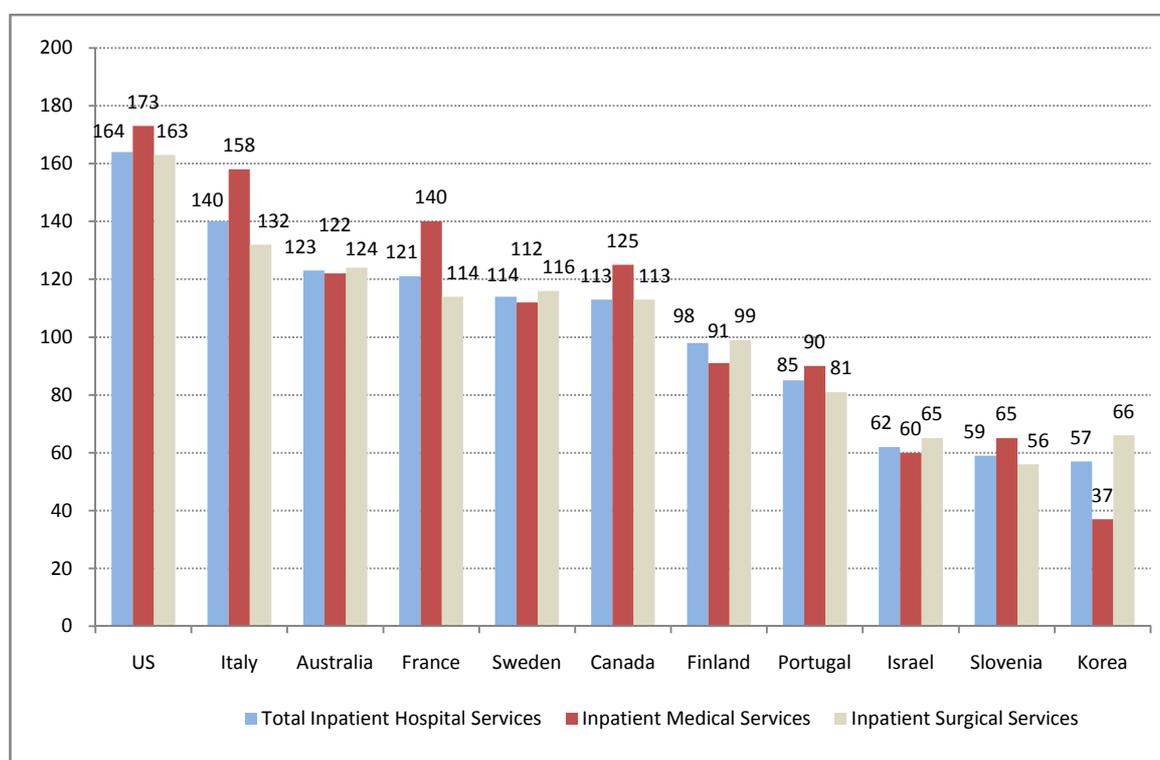
Note: "The indices are computed as dividing PPPs by market exchange rates, and the average of the group was calculated as the geometric mean of the comparative price levels (CPLs) of the different countries. The average was then set to equal to 100 and each country's CPL expressed in relation to it (15p)."

Increasing public finance in health care can also contribute to improve inequity as setting rational physician fees which are quite low compared to other high income countries. It is difficult to investigate physician fees (including hospital prices) among high income countries in a compatible way due to the difference of payment systems; however, given the general level of prices in Korea, the physician fees are still very low, as [Figure 9.1] demonstrates.[107] (Koechlin et al., 2010). The unmet target income caused by low fees for the covered services has negatively incentivized the health care providers to create more uncovered luxury-- may be medically unnecessary-- services to fill the income gap. At the same time, the provider induced demand for luxury health care services has unintentionally widened inequity in health care utilisation. However, this measure should be carefully employed in company with a strong control for minimizing uncovered services paid by patients. If not, setting rational physician fees may serve as a means to pursue private-owned providers' profits, which may exacerbate inequity in high quality health care

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[107] The graph can only give a brief hint on the level of price in Korea as the report has been challenged by some countries due to the price compatibility issue.

services for all.

Second, rational allocation of health care services through a gatekeeping system is also very crucial for quality health care for all in Korea. As discussed earlier, under the current KNHI system, patients are allowed to choose any level of health care institutions in accordance with their ability to pay. This means that rich patients with minor symptoms may be able to visit tertiary hospitals while poor patients with severe diseases may not be accessible to proper health care with quality. It is also proved by the result of this study. The total volume of health care utilisation is quite higher than the OECD average; however, intensity/quality health care is not utilized by health care needs, but by socioeconomic status. Therefore, it is necessary to be phased in a strict gatekeeping system for rational allocation of limited health care resources in accordance with medical necessity.

To sum up, enhancing public dominance in health care as expanding public finance and reforming the fee structure and the health care delivery system would be critical measures for improving inequity in health care utilisation in Korea. In addition, given unequal distribution of health care need factors across different SES groups which may be one of the major causes of inequity in health care utilisation, health care policies should be harmonized with other socioeconomic policies-- such as policies for alleviating income and regional polarization, and improving working conditions-- for the best policy effects.

9.3   Strengths and Limitations

This study has a couple of strengths. First, it extends the socioeconomic dimensions of inequity in the use of health care and attempts to compare the inequity patterns among the dimensions of income, wealth and education with the same index. Previous studies have mainly focused on income-related inequity in health care utilisation, although certain studies measure inequity in terms of the wealth and education status with different indices or statistical methods from the HIwv index. Second, this study utilizes a variety of variables for the need (health-related) and non-need (socioeconomic) factors in the need-standardization process with the minimized numbers of missing values. The Korea Welfare Panel Study data was collected through face-to-face interviews with well-trained interviewers. And third, it enables to examine inequity change in health care over time, as well.

On the other hand, the present study also has some limitations. First, severity of morbidity is not fully taken into account in the need-standardization process. The variables of health care needs used in this study includes the presence of absence of disease, disability and various chronic conditions in terms of dummy variables, and do not have detailed information about the severity of particular conditions. Second, the education related indices have limitations, including 1) correlation between age and education and relatively high sample attrition among elderly groups; and 2) education cannot be split into equally sized groups or treated as a continuous variable. Hence, the education-related HIwv indices are based on a grouped variable is not perfectly compatible with the indices of the income and wealth dimensions, although the indices are corrected by a statistical method suggested by Clarke & van Ourti (2010).

9.4 Suggestions for Further Studies

Inequity Analysis in Health Care Utilisation with Various SES Dimensions

This study has attempted to analyze inequity in health care utilisation with income, wealth and education dimensions; however, further studies can add more SES dimensions, e.g. employment and social class, for socioeconomic factors are closely related to health and health care. If possible, further studies may measure overall socioeconomic inequity in health care utilisation with a universal index and compare the degree of each socioeconomic factor's contribution to the overall inequity. At the same time, it is recommended that further studies should specify target population by age group with the similar characteristics, e.g. wealth for the aged after retirement or employment for the age groups who are economically active, in order to construct more useful data for making polices.

Ensuring Reliability of Research Utilizing Various Data and Methodologies

This study utilizes a household panel data with attrition for a certain age group, which may have an attrition bias. Therefore, using a cross-sectional data together with the panel survey data would be helpful for cross checking the completeness of the data. In addition, it is worthwhile observing the inequity changes in health care utilisation with the Korea Welfare Panel Study (KOWEPS) data in the form of a longitudinal study, as well. More

practically, an extended analysis of the current study with an updated KPWEPS data is necessary in order to examine changes after the year 2008.

Extending to the Policy Development Studies with Theories

Existing studies, including the present study (mainly Chapter 4), on Korean health policy have focused on describing the evolution of the health care system and its strengths/weaknesses in comparison with other health care systems around the globe. Although these studies have helped to understand the health care system and policy in Korea more clearly, they have tended to be descriptive. Therefore, further studies may need to extend the scope of analysis more historically and comprehensively with proper theories, such as path dependence theory (Pierson, 2004), to understand the impact of the past social, political and economical decisions on health policy on current and future policy decisions.

Appendices

[APPENDIX 1] EXPENDITURE ON HEALTH BY TYPE OF FINANCING AMONG OECD COUNTRIES, 2009

Country	general government	private sector	private insurance	OOP payment	other
Netherlands	84.7		5.5	6.2	3.7
Denmark	84.5		1.8	13.7	
United Kingdom	84.1		1.1	10.5	4.3
Norway	84.1			15.1	0.8
Luxembourg	84.0		3.1	11.6	1.2
Czech Republic	84.0		0.2	14.4	1.4
Iceland	82.0			16.6	1.4
Sweden	81.5			16.7	1.6
Japan	80.8		2.4	15.8	1.0
New Zealand	80.5		4.8	13.4	1.3
France	77.9		13.3	7.3	1.5
Italy	77.9		1.0	19.7	1.5
Austria	77.7	22.3			
Germany	76.9		9.3	13.1	0.7
Estonia	75.3		0.2	20.3	4.2
Belgium	75.1		4.8	20.0	0.2
Ireland	75.0		11.0	12.3	1.7
Finland	74.7		2.1	19.0	4.1
Spain	73.6		5.4	20.1	0.9
Slovenia	73.4		12.5	12.9	1.2
Turkey	73.0	27.0			
Poland	72.2		0.6	22.2	5.0
OECD	72.1	27.7			
Canada	70.6		12.7	14.6	2.1
Hungary	69.7		2.7	23.7	3.9
Australia	68.0		8.1	18.2	5.7
Slovak Republic	65.7			25.6	8.8
Portugal	65.1		4.9	27.2	2.9
Greece	60.3	39.7			
Switzerland	59.7		8.8	30.5	1.0
Israel	58.5		7.0	28.8	5.7
Korea	58.2		5.2	32.4	4.2
Mexico	48.3		4.0	47.8	
United States	47.7		32.8	12.3	7.2
Chile	47.4		18.6	34.0	

Source: OECD Health Data (2011)

Author	Year	Title	Data	Measure	Result				
					GP	*Hospital*	*Specialists*	*Dental*	*Exp. (or others)*
Van Doorslear, E., Koolman, X., & Puffer, F.	2002	Equity in the Use of Physician Visits in OECD Countries: Has Equal Treatment for Equal Need Been Achieved?	- *14 OECD Countries* - 12 EU Countries: ECHP (1996) - Canada: National Population Health Survey (1996) - US: Medical Expenditure Panel Survey (1996)	- HI$_{WV}$	pro-poor	NA	pro-rich	NA	NA
Van Doorslear, E., Koolman, X., & Jones, A.	2004	Explaining Income-Related Inequalities in Doctor Utilization in Europe	- *12 EU Countries* - ECHP (1996)	- HI$_{WV}$	pro-poor	NA	pro-rich	NA	NA
Van Doorslear, E.& Masseria, C.	2004	Income-Related Inequality in the Use of Medical Care in 21 OECD Countries	- *21 OECD Countries* - 10 EU Countries: ECHP (2000) - Other Countries (see table)	- HI$_{WV}$	fair/ mixed	fair/ mixed	pro-rich	pro-rich	NA
Masseria, C., Koolman, X. & van Doorslaer, E.	2004	Equity in the Delivery of Inpatient Care in the European Union: A Pooled Analysis	- *12 EU Countries* - ECHP: a pooled data for 5 years (1994-1998)	- HI$_{WV}$	NA	mixed/ pro-rich	pro-rich	NA	NA
Van Doorslear, E. et al.	2000	Equity in the Delivery of Health Care in Europe and the US	- *10 European Countries and the US* - Variety of national household survey data (1987-1996)	- HI$_{WV}$	fair/ pro-poor	NA	pro-rich	NA	NA
Van Doorslear, E.& Wagstaff, A.	1992	Equity in the Delivery of Health Care: Some International Comparisons	- *7 European Countries and the US* - Variety of national household survey data (1980-1987)	- HI$_{WVP}$	NA	NA	NA	NA	mixed/ pro-poor
Masseria, C.	2003	Equity in the Delivery of Inpatient Care in Italy	- Multiscopo Survey(1999-2000) - Eurostat Survey(2000): to obtain income information	- HI$_{WV}$	NA	mixed	NA	NA	NA
Layte, R. & Nolan, B.	2004	Equity in the Utilization of Health Care in Ireland	- Living in Ireland Survey(2000)	- HI$_{WV}$	pro-rich	pro-rich	NA	NA	fair (medicine)
Van Doorslear, E., Buytendijk J, & Geurts, J.	2001	Income-Related Inequalities and Inequalities in Health Care Utilization: Belgium and the Netherlands Compared	- Belgian Health Interview Survey(1997) - Netherlands Health Interview Survey(1997)	- HI$_{WV}$	fair	fair/ pro-poor	pro-rich	NA	NA
Gundgaard, J.	2006	Income-related Inequality in Utilization of Health Services in Denmark	- Health Survey of Funen County(2000-2001)	- HI$_{WV}$	fair	fair	fair	pro-rich	pro-rich (medicine & therapist)
Allin, Masseria & Missialos	2006	Inequality in Health Care Use among Older People in the United Kingdom: An Analysis of Panel Data	- British Household Panel Survey (1997-2003)	- HI$_{WV}$	pro-rich	pro-rich	pro-rich	pro-rich	NA

Author	Year	Title	Data	Measure	Result				
					GP	Hospital	Specialists	Dental	Exp. (or others)
Van Ourti, T.	2004	Measuring Horizontal Inequity in Belgian Health Care Using a Gaussian Random Effects Two Part Count Data Model	- Panel Study of Belgian Households (PSBH) (1994-2001)	- HIwv	pro-poor	pro-poor	Fair→ pro-rich	NA	NA
Allin, S.	2006	Equity in the Use of Health Services in Canada and Its Provinces	- Canadian Community Health Survey (CCHS) (2003)	- HIwv	fair	pro-poor	pro-rich	pro-rich	NA
van Doorslaer, E., Clarke, P., Savage, E. & Hall, J.	2008	Horizontal Inequities in Australia's Mixed Public/Private Health Care System	- Australian National Health Survey (2001)	- HIwv	pro-poor	pro-poor	pro-rich	NA	NA
Hajizadeh, M., Connelly, L. B. & Butler, J.R.G.	2012	Health Policy and Horizontal Inequities of Health-Care Utilization in Australia: 1983-2005	- Australian National Health Survey (1983-2005)	-HIwvp	pro-poor	pro-poor	pro-rich	pro-rich	fair/ pro-rich
Ohkusa, Y. & Honda, C.	2003	Horizontal Inequity in Health Care Utilization in Japan	- Comprehensive Survey of Living Conditions in Japan (CSLCJ) (1992-1998)	- HIwv	pro-poor	NA	NA	NA	NA
Ohkusa, Y. & Honda, C.	2003	Updated Horizontal Inequity in Health Care Utilization in Japan: Comparisons with OECD Countries Using an Original Survey	- conducted a survey for the current study (2002-2003)	- HIwv	fair	fair	NA	NA	pro-rich (OOP Payment)
Zhou, Z., Gao, J., Fox, A., Rao, K., Xu, K., Xu, L. & Zhang, Y.	2011	Measuring the Equity of Inpatient Utilization in Chinese Rural Areas	- National Health Service Survey (NHSS) (2003, 2008)	- HIwv	NA	pro-rich	NA	NA	NA
Zhou, Z., Su, Y., Gao, J., Campbell, B., Zhu, Z. & Xu, L.	2013	Assessing Equity of Healthcare Utilization in Rural China: Results from Nationally Representative Surveys from 1993 to 2008	- National Health Service Survey (NHSS) (1993, 1998, 2003, 2008)	- HIwv	pro-rich → pro-poor	pro-rich	NA	NA	NA

[APPENDIX 3] NUMBER OF MEDICAL CARE INSTITUTIONS AND PHARMACIES BY ESTABLISHMENT TYPE, 2011

(UNIT: ESTABLISHMENT)

		Total	National	Public	Military	Private								
						School/ Religious Foundation	Special Juridical Corporation	Social Welfare Foundation	Corporation Aggregate	Juridical Foundation	Company	Medical Corporation	Individual	Others
Total		82,948	31	3,554	44	153	262	126	245	192	81	1,107	77,150	3
Medical Institutions	Subtotal	64,869	31	3,554	44	153	262	126	245	192	81	1,107	77,150	3
	Tertiary Hospitals	44	-	-	-	31	9	1	-	1	-	2	-	-
	General Hospitals	275	1	30	-	35	20	1	-	22	-	98	68	-
	Hospitals	2,363	9	41	20	18	50	50	16	36	2	702	1,417	2
	Clinics	27,837	16	6	3	22	103	59	174	90	67	183	27,113	1
	Dental	15,257	4	2	7	15	26	2	22	7	12	26	15,134	-
	Midwifery	40	-	-	-	-	-	-	-	-	-		-	-
	Health Centres	3,468	-	3,468	-	-	-	-	-	-	-	-		-
	Oriental Medicine	12,585	1	6	14	32	54	13	33	35	-	96	12,300	-
Pharmacy		21,079	-	-	-	-	-	-	-	1	-	-	21,078	-

Source: National Health Insurance Statistical Yearbook of 2011 (2012)

[APPENDIX 4] THE DRGS PROGRAM PARTICIPATION STATUS, 2002-2009

Year	Classification	Total	Tertiary Hosp.	General Hosp.	Hospitals	Clinics	No. of Target Institutions
2002	No. of Participation	1,839	4	109	153	1,573	3,196
	Participation %	57.5	9.5	45.2	49.0	60.5	
2003	No. of Participation	1,965	2	112	174	1,677	3,337
	Participation %	58.9	4.8	46.5	46.3	62.6	
2004	No. of Participation	2,066	2	102	184	1,778	3,407
	Participation %	60.6	4.8	42.2	42.9	66.0	
2005	No. of Participation	2,213	1	101	188	1,923	3,523
	Participation %	62.8	2.4	40.6	40.5	69.5	
2006	No. of Participation	2,277	1	96	201	1,979	3,429
	Participation %	66.4	2.3	37.9	44.0	74.0	
2007	No. of Participation	2,350	1	101	198	2,050	3,408
	Participation %	69.0	2.3	38.7	41.7	78.0	
2008	No. of Participation	2,365	1	93	189	2,082	3,399
	Participation %	69.6	2.3	34.6	40.8	79.3	
2009	No. of Participation	2,346	0	86	184	2,076	3,352
	Participation %	70.0	0	31.7	39.3	81.0	

Source: Health Insurance Review & Assessment Service, 2009

Classification	Current	Proposal	Expected Impact
Enter (Eligibility)	- medical professionals with license only - individual professionals are allowed to establish only one clinic or hospital per person	- anyone can establish medical institutions with certain qualification - individual medical professionals can establish multiple medical institutions	- diversify investment routes on hospitals - promote freedom of occupational choice (non-medical professionals will be able to be participate in medical areas)

For-Profit Status
 	
(Investment & Distribution)
	- private individual medical institutions can pursue profits from their business
	- private medical corporations cannot pursue profits from their business
	  : non-distribution constraints: the profits should be reinvested into the medical service areas (facilities, equipments, research, etc.) only
	  : limited auxiliary business allowed, such as medical relevant education, research, elderly welfare facilities, funeral home, auxiliary parking business, medical information technology development & operation, catering, and barber/beauty shops
		- both private individual institutions & private medical corporations can pursue profits from their business
		  : profit sharing among share holders (investors) will be possible
		- all corporation types, such as ordinary partnership, limited partnership, private company, and company limited by shares, will be allowed
		- on top of the current auxiliary business, establishment of Management Service Organization (MSO) will be possible
		- Issue of hospital bonds
		* It is possible that medical corporations wish to stay not-for-profit status for tax purpose.
			- provide incentives to hospital investment
			- promote transparency in accounting as legitimating the for-profit medical corporations
			- achieve fairness between private medical institutions (individual vs. corporation) and between not-for-profit corporations (medical corporation vs. social welfare corporations) in operating for-profit auxiliary business

Exit	- no specific exit options for insolvent hospitals	- M & A is allowed	- eliminate malfunctioning medical institutions in the market, providing more options

[Appendix 6] Number of Hospitals and Clinics by Institution Type, 2000-2008

(Unit: establishment)

Year	Total	Hospitals and clinics				Dental hospitals & clinics	Midwifery Clinics	Health Centers	Oriental medicine hospitals & clinics
		Tertiary Hospitals	General Hospitals	Hospitals	Clinics				
2000	42,246	43	245	681	19,688	10,652	126	3,427	7,384
2001	44,360	43	234	705	21,342	10,855	86	3,392	7,703
2002	46,822	42	241	783	22,760	11,247	82	3,390	8,277
2003	48,698	42	241	871	23,559	11,659	70	3,405	8,851
2004	50,556	42	241	970	24,301	12,191	63	3,416	9,332
2005	52,288	42	249	1,112	25,166	12,672	52	3,425	9,910
2006	54,475	43	253	1,322	25,789	13,138	51	3,437	10,442
2007	56,073	43	261	1,639	26,141	13,492	51	3,445	11,001
2008	57,628	43	269	1,883	26,528	13,918	51	3,456	11,480
2009	59,255	44	269	2,039	27,027	14,425	49	3,445	11,940
2010	60,585	44	274	2,182	27,469	14,872	46	3,452	12,229
2011	61,547	44	275	2,363	27,837	15,257	40	3,451	12,585

Source: National Health Insurance Statistical Yearbook of 2011 (2012)
*Excluding pharmacies

[APPENDIX 7] SELECTED DISEASES BY THREE DIMENSIONS OF SES GROUPS

Disease	SES	Most Disadvantaged	2nd Disadvantaged	Middle	2nd Advantaged	Most Advantaged	Total
cancer	income	79 (41.58%)	47 (24.74%)	24 (12.63%)	23 (12.11%)	17 (8.95%)	190 (100%)
	wealth	36 (22.50%)	36 (22.50%)	26 (16.25%)	33 (20.63%)	29 (18.13)	160 (100%)
	education	28 (14.74%)	71 (37.37%)	21 (11.05%)	55 (28.95%)	15 (7.89%)	190 (100%)
diabetes	income	338 (53.99%)	118 (18.85%)	81 (12.94%)	49 (7.83%)	40 (6.39%)	626 (100%)
	wealth	178 (33.27%)	97 (18.13%)	88 (16.45%)	86 (16.07%)	86 (16.07%)	535 (100%)
	education	136 (21.73%)	235 (37.54%)	90 (14.38%)	119 (19.01%)	46 (7.35%)	626 (100%)
hypertension/ hypotension	income	807 (50.50%)	313 (19.59%)	203 (12.70%)	157 (9.82%)	118 (7.38%)	1,598 (100%)
	wealth	342 (24.27%)	279 (19.91%)	248 (17.70%)	257 (18.34%)	275 (19.63%)	1,401 (100%)
	education	352 (22.03%)	568 (35.54%)	243 (15.21%)	299 (18.71%)	136 (8.51%)	1,598 (100%)
stroke/ cerebrovascular disease	income	106 (50.96%)	45 (21.63%)	28 (13.46%)	16 (7.69%)	13 (6.25%)	208 (100%)
	wealth	51 (28.81%)	42 (23.73%)	31 (17.51%)	29 (16.38%)	24 (13.56%)	177 (100%)
	education	44 (19.27%)	85 (40.87%)	35 (16.83%)	28 (13.46%)	16 (7.69%)	208 (100%)
myocardial infarction	income	119 (54.59%)	38 (17.43%)	23 (10.55%)	19 (8.72%)	19 (8.72%)	218 (100%)
	wealth	48 (26.67%)	41 (22.78%)	35 (19.44%)	25 (13.89%)	31 (17.22%)	180 (100%)
	education	42 (19.27%)	87 (39.91%)	27 (12.83%)	39 (17.89%)	23 (10.55%)	218(100%)
asthma	income	57 (72.15%)	9 (11.39%)	8 (10.13%)	2 (2.53%)	3 (3.80%)	79 (100%)
	wealth	26 (37.68%)	11 (15.94%)	15 (21.74%)	10 (14.49%)	7 (10.14%)	69 (100%)
	education	24 (30.38%)	23 (29.11)	14 (17.72%)	11 (13.92%)	7 (8.86%)	79 (100%)
chronic renal failure	income	20 (41.67%)	13 (27.08%)	6 (12.50%)	7 (14.58%)	2 (4.17%)	48 (100%)
	wealth	15 (35.71%)	8 (19.05%)	5 (11.90%)	3 (7.14%)	11 (26.19%)	42 (100%)
	education	4 (8.33%)	10 (20.83%)	7 (14.58%)	19 (39.58%)	8 (16.67%)	48 (100%)

[APPENDIX 8] SELECTED DISABILITIES BY THREE DIMENSIONS OF SES GROUPS

Disability	SES	Most Disadvantaged	2nd Disadvantaged	Middle	2nd Advantaged	Most Advantaged	Total
physical disability	income	305 (50.00%)	144 (85%)	85 (13.93%)	49 (8.03%)	27 (4.43%)	610 (100%)
	wealth	179 (34.89%)	116 (22.61%)	93 (19.13%)	62 (12.09%)	63 (12.28%)	513 (100%)
	education	108 (17.70%)	239 (39.18%)	96 (15.74%)	124 (20.33%)	43 (7.05%)	610 (100%)
brain lesion	income	74 (56.92%)	25 (19.23%)	12 (9.23%)	6 (4.62%)	13 (10%)	130 (100%)
	wealth	40 (34.19%)	28 (23.92%)	20 (17.09%)	13 (11.11%)	16 (13.68%)	117 (100%)
	education	28 (21.54%)	42 (32.31%)	20 (15.38%)	29 (22.31%)	11 (8.46%)	130 (100%)
visual impairment	income	78 (61.42%)	20 (15.75%)	13 (10.24%)	12 (9.45%)	4 (3.15%)	127 (100%)
	wealth	42 (40.38%)	25 (24.04%)	16 (15.38%)	8 (7.69%)	13 (12.50%)	104 (100%)
	education	25 (19.69%)	39 (30.71%)	24 (18.90%)	30 (23.62%)	9 (7.09%)	127 (100%)
hearing impairment	income	69 (66.35%)	22 (21.15%)	8 (7.69%)	5 (4.81%)	0 (0.00%)	104 (100%)
	wealth	32 (39.02%)	22 (26.83%)	10 (12.20%)	12 (14.63%)	6 (7.32%)	82 (100%)
	education	29 (27.88%)	36 (34.62%)	21 (20.19%)	12 (11.54%)	6 (5.77%)	104 (100%)
mental disorder	income	27 (64.29%)	8 (19.05%)	5 (11.90%)	2 (6.25%)	0 (0.00%)	42 (100%)
	wealth	21 (56.76%)	7 (18.92%)	7 (18.92%)	1 (2.7%)	1 (2.7%)	37 (100%)
	education	1 (2.38%)	11 (26.19%)	2 (4.76%)	19 (45.24%)	9 (21.43%)	42(100%)
kidney failure	income	12 (37.50%)	9 (28.12%)	2 (6.25%)	8 (25.00%)	1 (3.13%)	32 (100%)
	wealth	9 (33.33%)	3 (11.11%)	4 (14.81%)	2 (7.41%)	9 (33.33%)	27 (100%)
	education	1 (3.13%)	7 (21.88%)	8 (25.00%)	11 (34.38%)	5 (15.63%)	32 (100%)
heart failure	income	7 (46.67%)	5 (33.33)	1 (6.67%)	2 (13.33%)	0 (0%)	15 (100%)
	wealth	7 (50.00%)	3 (21.43%)	1 (7.14%)	2 (14.29%)	1 (7.14%)	14 (100%)
	education	4 (26.67%)	4 (26.67%)	1 (6.67%)	6 (40.00%)	0 (0.00%)	15 (100%)

[APPENDIX 9] HEALTH CARE UTILISATION BY INCOME QUINTILES, TOTAL NUMBER

			2008		
Utilisation Type	Income Quintile	Group Size (N)	Actual Utilisation	Need-Predicted Utilisation	Need-Stdzd Utilisation
Outpatient Visits	Poorest	3,225	21.063	18.550	14.592
	2n Poorest	2,092	12.361	12.599	11.841
	Middle	1,651	10.073	11.106	10.745
	2nd Richest	1,435	9.285	9.964	11.399
	Richest	1,183	9.080	9.852	11.306
	Average		*12.373*		
Inpatient Admissions	Poorest	3,226	0.226	0.228	0.151
	2n Poorest	2,090	0.184	0.158	0.180
	Middle	1,651	0.161	0.138	0.177
	2nd Richest	1,435	0.115	0.151	0.151
	Richest	1,183	0.170	0.205	0.205
	Average		*0.171*		
Inpatient Days	Poorest	3,226	4.274	4.576	2.227
	2n Poorest	2,090	3.362	2.778	3.443
	Middle	1,651	2.596	2.214	3.241
	2nd Richest	1,435	1.602	1.816	2.644
	Richest	1,183	1.814	1.876	2.796
	Average		*2.730*		
Medical Checkups	Poorest	3,225	0.360	0.455	0.304
	2n Poorest	2,090	0.379	0.409	0.369
	Middle	1,651	0.420	0.405	0.414
	2nd Richest	1,435	0.514	0.396	0.517
	Richest	1,182	0.637	0.399	0.638
	Average		*0.462*		
Health Care Expenditure (KRW)	Poorest	3,225	588,903	729,496	386,362
	2n Poorest	2,092	549,847	536,021	540,681
	Middle	1,651	588,798	494,809	620,944
	2nd Richest	1,435	577,054	456,691	647,318
	Richest	1,183	825,453	454,351	898,806
	Average		*631,643*		

Utilisation Type	Income Quintile	Group Size (N)	Prob. of Actual Utilisation	Prob. of Need-Predicted Probability	Prob. of Need-Standardized Utilisation
			2008		
Outpatient Visits	Poorest	3,225	0.839	0.877	0.723
	2n Poorest	2,092	0.758	0.789	0.730
	Middle	1,651	0.778	0.781	0.758
	2nd Richest	1,435	0.746	0.749	0.758
	Richest	1,183	0.746	0.750	0.757
	Average			*0.774*	
Inpatient Admissions	Poorest	3,225	0.155	0.152	0.112
	2n Poorest	2,092	0.118	0.114	0.112
	Middle	1,651	0.125	0.105	0.129
	2nd Richest	1,435	0.098	0.092	0.115
	Richest	1,183	0.118	0.093	0.135
	Average			*0.123*	
Medical Checkups	Poorest	3,225	0.360	0.455	0.301
	2n Poorest	2,092	0.379	0.409	0.350
	Middle	1,651	0.420	0.405	0.402
	2nd Richest	1,435	0.514	0.396	0.506
	Richest	1,183	0.637	0.399	0.621
	Average			*0.449*	
Tertiary Hospital Visits	Poorest	3,225	0.138	0.189	0.059
	2n Poorest	2,092	0.099	0.115	0.095
	Middle	1,651	0.099	0.099	0.110
	2nd Richest	1,435	0.088	0.081	0.117
	Richest	1,183	0.109	0.081	0.138
	Average			*0.107*	

[Appendix 11] Health Care Utilisation by Wealth Quintiles, Total Number

Utilisation Type	Wealth Quintile	Group Size (N)	Actual Utilisation	Need-Predicted Utilisation	Indirectly-Stdzd Utilisation
			2008		
Outpatient Visits	Poorest	2,398	16.490	14.156	14.071
	2n Poorest	2,100	11.719	12.224	11.573
	Middle	1,820	10.736	11.713	11.102
	2nd Wealthiest	1,674	10.838	11.675	11.242
	Wealthiest	1,594	12.420	12.582	11.918
	Average			*12.373*	
Inpatient Admissions	Poorest	2,397	0.210	0.210	0.180
	2n Poorest	2,100	0.159	0.171	0.162
	Middle	1,823	0.152	0.160	0.163
	2nd Wealthiest	1,671	0.176	*0.152*	0.194
	Wealthiest	1,594	0.159	0.163	0.168
	Average			*0.171*	
Inpatient Days	Poorest	2,397	3.612	3.862	2.919
	2n Poorest	2,100	2.892	2.631	3.144
	Middle	1,823	2.418	2.363	2.902
	2nd Wealthiest	1,671	2.294	2.155	2.947
	Wealthiest	1,594	2.434	2.639	2.785
	Average			*2.730*	
Medical Checkups	Poorest	2,398	0.358	0.461	0.345
	2n Poorest	2,100	0.411	0.452	0.411
	Middle	1,817	0.457	0.455	0.455
	2nd Wealthiest	1,675	0.555	0.461	0.544
	Wealthiest	1,593	0.529	0.479	0.495
	Average			*0.462*	
Health Care Expenditure (KRW)	Poorest	2,398	475,328	678,218	437,863
	2n Poorest	2,100	513,559	614,499	521,499
	Middle	1,820	539,026	596,042	562,839
	2nd Wealthiest	1,674	716,429	586,321	742,720
	Wealthiest	1,594	885,899	654,600	845,567
	Average			*625,941*	

[APPENDIX 12] HEALTH CARE UTILISATION BY WEALTH QUINTILES, PROBABILITY

Utilisation Type	Wealth Quintile	Group Size (N)	Prob. of Actual Utilisation	Prob. of Need-Predicted Utilisation	Prob. of Need-Stdz. Utilisation
			2008		
Outpatient Visits	Poorest	2,398	0.775	0.802	0.734
	2n Poorest	2,100	0.761	0.782	0.740
	Middle	1,820	0.763	0.778	0.746
	2nd Wealthiest	1,674	0.783	0.782	0.762
	Wealthiest	1,594	0.787	0.803	0.745
	Total/Average	*9,586*		*0.774*	
Inpatient Admissions	Poorest	2,398	0.132	0.127	0.114
	2n Poorest	2,100	0.116	0.112	0.113
	Middle	1,820	0.112	0.106	0.115
	2nd Wealthiest	1,674	0.126	0.103	0.132
	Wealthiest	1,594	0.127	0.106	0.130
	Total/Average	*9,586*		*0.123*	
Medical Checkups	Poorest	2,398	0.338	0.398	0.327
	2n Poorest	2,100	0.401	0.387	0.402
	Middle	1,820	0.448	0.390	0.445
	2nd Wealthiest	1,674	0.542	0.399	0.531
	Wealthiest	1,594	0.517	0.422	0.483
	Total/Average	*9,586*		*0.449*	
Tertiary Hospital Visit	Poorest	2,398	0.095	0.135	0.071
	2n Poorest	2,100	0.102	0.109	0.103
	Middle	1,820	0.107	0.102	0.115
	2nd Wealthiest	1,674	0.098	0.101	0.107
	Wealthiest	1,594	0.132	0.117	0.125
	Total/Average	*9,586*		*0.107*	

Utilisation Type	Education Group	Group Size (N)	Actual Utilisation	Need Predicted Utilisation	Need-Standardized Utilisation
			2008		
Outpatient Visits	No Edu	1,041	29.551	25.350	16.279
	Elementary	2,277	24.128	20.952	15.256
	Middle	1,264	14.766	15.922	10.923
	High	2,986	8.895	9.906	11.068
	Junior Col. +	2,018	7.095	7.839	11.334
	Total/Average	*9,586*		*12.029*	
Inpatient Admissions	No Edu	1,041	0.259	0.251	0.162
	Elementary	2,277	0.300	0.222	0.232
	Middle	1,263	0.169	0.180	0.142
	High	2,986	0.137	0.133	0.158
	Junior Col. +	2,018	0.136	0.115	0.174
	Total/Average	*9,585*		*0.173*	
Inpatient Days	No Edu	1,041	5.976	4.979	3.855
	Elementary	2,277	5.565	4.238	4.155
	Middle	1,263	3.214	3.380	2.692
	High	2,986	2.144	2.199	2.803
	Junior Col. +	2,018	1.337	1.806	2.389
	Total/Average	*9,585*		*2.919*	
Medical Checkups	No Edu	1,041	0.359	0.449	0.309
	Elementary	2,275	0.449	0.479	0.370
	Middle	1,263	0.466	0.467	0.398
	High	2,986	0.421	0.398	0.423
	Junior Col. +	2,018	0.531	0.368	0.563
	Total/Average	*9,583*		*0.450*	
Health Care Expenditure (KRW)	No Edu	1,041	713,281	850,554	389,682
	Elementary	2,277	942,536	775,748	693,743
	Middle	1,264	688,332	643,565	571,723
	High	2,986	512,976	459,206	580,726
	Junior Col. +	2,018	567,476	409,149	685,282
	Total/Average	*9,586*		*619,816*	

Utilisation Type	Education Group	Group Size (N)	Actual Utilisation	Need Predicted Utilisation	Indirectly-Stdzd Utilisation
			2008		
Outpatient Visits	No Edu	1,041	0.926	0.945	0.741
	Elementary	2,277	0.905	0.915	0.751
	Middle	1,264	0.841	0.858	0.744
	High	2,986	0.731	0.753	0.739
	Junior Col. +	2018	0.709	0.719	0.751
	Total/Average	*9,586*		*0.745*	
Inpatient Admissions	No Edu	1,041	0.191	0.168	0.132
	Elementary	2,277	0.175	0.149	0.135
	Middle	1,264	0.129	0.125	0.113
	High	2,986	0.112	0.100	0.121
	Junior Col. +	2018	0.096	0.092	0.114
	Total/Average	*9,586*		*0.121*	
Medical Checkups	No Edu	1,041	0.350	0.432	0.305
	Elementary	2,277	0.433	0.465	0.356
	Middle	1,264	0.458	0.455	0.391
	High	2,986	0.404	0.386	0.406
	Junior Col. +	2018	0.523	0.357	0.553
	Total/Average	*9,586*		*0.437*	
Tertiary Hospital visits	No Edu	1,041	0.136	0.198	0.048
	Elementary	2,277	0.146	0.179	0.077
	Middle	1,264	0.112	0.146	0.077
	High	2,986	0.098	0.096	0.112
	Junior Col. +	2018	0.091	0.077	0.124
	Total/Average	*9,586*		*0.103*	

Utilisation Type	Income Quintile	Group Size (N)		Actual Utilisation		Need-Predicted Utilisation		Need-Stdzd Utilisation	
		2005	2008	2005	2008	2005	2008	2005	2008
Outpatient Visits	Poorest	4,356	3,225	22.5106	21.0626	20.2824	18.5499	14.3072	14.5917
	2n Poorest	2,607	2,092	12.3770	12.3613	12.8141	12.5993	11.6418	11.8410
	Middle	1,949	1,651	10.4969	10.0728	10.1505	11.4063	12.4253	10.7454
	2nd Richest	1,713	1,435	7.2870	9.2848	8.2384	9.9643	11.1276	11.3995
	Richest	1,480	1,183	6.5390	9.0897	7.3199	9.8523	11.2980	11.3064
	Tot./Avg	*12,105*	*9,586*	*11.8439*	*12.3733*	*11.8439*	*12.3733*	*11.8439*	*12.3733*
Inpatient Admissions	Poorest	4,356	3,226	0.2461	0.2255	0.2796	0.2280	0.1204	0.1514
	2n Poorest	2,607	2,090	0.1408	0.1839	0.1705	0.1577	0.1241	0.1801
	Middle	1,949	1,651	0.1242	0.1615	0.1290	0.1384	0.1490	0.1769
	2nd Richest	1,712	1,435	0.1105	0.1154	0.1048	0.1179	0.1596	0.1513
	Richest	1,481	1,183	0.7848	0.1698	0.0918	0.1192	0.1406	0.2045
	Tot/Avg	*12,105*	*9,585*	*0.1400*	*0.1712*	*0.1400*	*0.1712*	*0.1400*	*0.1712*
Inpatient Days	Poorest	4,356	3,226	5.4218	4.2742	6.3442	4.5755	1.9357	2.5568
	2n Poorest	2,607	2,090	3.6399	3.3623	3.3067	2.7778	3.1913	3.4426
	Middle	1,949	1,651	3.0236	2.5961	2.3093	2.2135	3.5725	3.2407
	2nd Richest	1,712	1,435	1.4833	1.6023	1.7141	1.8116	2.6273	2.6442
	Richest	1,481	1,183	1.2300	1.8136	1.4366	1.8760	2.6515	2.7957
	Tot/Avg	*12,105*	*9,585*	*2.9604*	*2.7300*	*2.9604*	*2.7300*	*2.9604*	*2.7300*
Medical Checkups	Poorest	4,354	3,225	0.2644	0.3595	0.4444	0.4545	0.2192	0.3042
	2n Poorest	2,609	2,090	0.2498	0.3789	0.3959	0.4095	0.2531	0.3687
	Middle	1,948	1,651	0.3146	0.4197	0.3771	0.4049	0.3368	0.4140
	2nd Richest	1,710	1,435	0.4050	0.5140	0.3631	0.3957	0.4412	0.5174
	Richest	1,480	1,182	0.5123	0.6374	0.3617	0.3988	0.5499	0.6378
	Tot/Avg	*12,101*	*9,583*	*0.3492*	*0.4619*	*0.3884*	*0.4619*	*0.3599*	*0.4619*
Health Care Expenditure (KRW)	Poorest	4,359	3,225	461,258	588,903	785,241	729,496	202,973	386,362
	2n Poorest	2,608	2,092	405,939	549,747	550,062	536,021	382,832	540,681
	Middle	1,943	1,651	432,040	588,798	471,318	494,809	487,677	620,944
	2nd Richest	1,714	1,435	431,892	577,054	413,350	456,691	545,497	647,318
	Richest	1,480	1,183	508,355	825,453	385,180	454,351	650,131	898,806
	Tot/Avg	*12,104*	*9,586*	*447,882*	*631,643*	*447,882*	*631,643*	*447,882*	*631,643*

Utilisation Type	Income Quintile	Group Size (N)		Actual Utilisation		Need-Predicted Utilisation		Need-Stdzd Utilisation	
		2005	*2008*	*2005*	*2008*	*2005*	*2008*	*2005*	*2008*
Outpatient Visits	Poorest	4,356	3,225	0.8376	0.8395	0.8626	0.8772	0.7357	0.7231
	2n Poorest	2,607	2,092	0.7495	0.7581	0.7596	0.7893	0.7506	0.7295
	Middle	1,949	1,651	0.7362	0.7784	0.7151	0.7806	0.7819	0.7585
	2nd Richest	1,714	1,435	0.7192	0.7458	0.6850	0.7487	0.7949	0.7579
	Richest	1,480	1,183	0.7100	0.7463	0.6679	0.7499	0.8028	0.7572
	Tot/Avg	*12,106*	*9,586*	*0.7505*	*0.7736*	*0.7505*	*0.7736*	*0.7505*	*0.7736*
Inpatient Admissions	Poorest	4,356	3,226	0.1426	0.1551	0.1723	0.1515	0.0791	0.1124
	2n Poorest	2,607	2,090	0.1051	0.1177	0.1161	0.1142	0.0978	0.1124
	Middle	1,949	1,651	0.0895	0.1252	0.0938	0.1053	0.1045	0.1288
	2nd Richest	1,712	1,435	0.0823	0.0976	0.0827	0.0918	0.1109	0.1147
	Richest	1,481	1,183	0.0693	0.1183	0.0729	0.0926	0.1053	0.1345
	Tot/Avg	*12,105*	*9,585*	*0.0978*	*0.1228*	*0.0978*	*0.1228*	*0.0978*	*0.1228*
Medical Checkups	Poorest	4,354	3,225	0.2506	0.3505	0.4261	0.4370	0.2123	0.3012
	2n Poorest	2,609	2,090	0.2464	0.3598	0.3836	0.3972	0.2480	0.3504
	Middle	1,948	1,651	0.3067	0.4081	0.3673	0.3936	0.3269	0.4023
	2nd Richest	1,710	1,435	0.3967	0.5050	0.3552	0.3864	0.4293	0.5064
	Richest	1,480	1,182	0.4965	0.6226	0.3548	0.3896	0.5295	0.6208
	Tot/Avg	*12,101*	*9,583*	*0.3388*	*0.4491*	*0.3388*	*0.4491*	*0.3388*	*0.4491*
Tertiary Hospital Visits	Poorest	4,359	3,225	0.1644	0.1378	0.2152	0.1887	0.0593	0.0592
	2n Poorest	2,608	2,092	0.1132	0.0995	0.1207	0.1149	0.1027	0.0947
	Middle	1,943	1,651	0.0969	0.0987	0.0866	0.0985	0.1205	0.1103
	2nd Richest	1,714	1,435	0.0995	0.0884	0.0640	0.0814	0.1457	0.1172
	Richest	1,480	1,183	0.0903	0.1095	0.0830	0.0812	0.1474	0.1384
	Tot/Avg	*12,104*	*9,586*	*0.1129*	*0.1068*	*0.1129*	*0.1068*	*0.1129*	*0.1040*

Utilisation Type	Income Quintile	Group Size (N)		Actual Utilisation		Need-Predicted Utilisation		Need-Stdzd Utilisation	
		2005	2008	2005	2008	2005	2008	2005	2008
Outpatient Visits	Poorest	3,168	2,398	17.4240	16.1488	14.8184	14.1565	14.6846	14.0712
	2n Poorest	2,550	2,100	12.2561	11.7186	11.6490	12.2243	12.6860	11.5733
	Middle	2,324	1,820	10.1598	10.7361	10.4876	11.7133	11.7511	11.1074
	2nd Richest	2,125	1,674	9.6497	10.8375	10.6766	11.6752	11.0521	11.2420
	Richest	1,938	1,594	9.7276	12.4205	11.1985	12.5819	10.6081	11.9176
	Tot./Avg	*12,105*	*9,586*	*11.8439*	*12.3733*	*11.8439*	*12.3733*	*11.8439*	*12.3733*
Inpatient Admissions	Poorest	3,168	2,397	0.1919	0.2096	0.2147	0.1839	0.1310	0.1796
	2n Poorest	2,551	2,100	0.1502	0.1595	0.1591	0.1515	0.1450	0.1619
	Middle	2,322	1,823	0.1173	0.1520	0.1397	0.1425	0.1315	0.1634
	2nd Richest	2,127	1,671	0.1211	0.1764	0.1315	0.1365	0.1435	0.1938
	Richest	1,937	1,594	0.1195	0.1586	0.1324	0.1449	0.1410	0.1676
	Tot/Avg	*12,105*	*9,585*	*0.1400*	*0.1712*	*0.1400*	*0.1712*	*0.1400*	*0.1712*
Inpatient Days	Poorest	3,168	2,397	5.1251	3.6117	4.6683	3.5507	3.3149	2.9191
	2n Poorest	2,551	2,100	2.9288	2.8922	3.1368	2.6068	2.6501	3.1436
	Middle	2,322	1,823	2.4197	2.4177	2.6261	2.3738	2.6517	2.9021
	2nd Richest	2,127	1,671	2.2159	2.2939	2.3573	2.2047	2.7167	2.9473
	Richest	1,937	1,594	2.1114	2.4339	2.3371	2.5073	2.6324	2.7847
	Tot/Avg	*12,105*	*9,585*	*2.9604*	*2.7300*	*2.9604*	*2.7300*	*2.9604*	*2.7300*
Medical Checkups	Poorest	3,167	2,398	0.2484	0.3585	0.3991	0.4267	0.2485	0.3450
	2n Poorest	2,555	2,100	0.3147	0.4105	0.3779	0.3989	0.3360	0.4108
	Middle	2,337	1,817	0.3278	0.4569	0.3718	0.4010	0.3553	0.4551
	2nd Richest	2,105	1,675	0.4022	0.5548	0.3889	0.4101	0.4125	0.5438
	Richest	1,937	1,593	0.4530	0.5289	0.4106	0.4331	0.4416	0.4950
	Tot/Avg	*12,101*	*9,583*	*0.3492*	*0.4619*	*0.3492*	*0.4619*	*0.3492*	*0.4619*
Health Care Expenditure (KRW)	Poorest	3,168	2,398	374,555	475,329	603,367	564,421	298,144	437,863
	2n Poorest	2,551	2,100	368,280	513,560	508,231	519,016	387,004	521,499
	Middle	2,343	1,820	380,839	539,131	480,209	503,247	427,585	562,839
	2nd Richest	2,104	1,674	457,599	716,139	497,274	500,375	487,280	742,720
	Richest	1,938	1,594	658,709	885,899	530,121	567,288	655,543	845,567
	Tot/Avg	*12,104*	*9,586*	*447,882*	*625,941*	*447,882*	*625,941*	*447,882*	*625,941*

Utilisation Type	Income Quintile	Group Size (N)		Actual Utilisation		Need-Predicted Utilisation		Need-Stdzd Utilisation	
		2005	*2008*	*2005*	*2008*	*2005*	*2008*	*2005*	*2008*
Outpatient Visits	Poorest	3,168	2,398	0.7473	0.7746	0.7765	0.8016	0.7316	0.7338
	2n Poorest	2,551	2,100	0.7474	0.7614	0.7304	0.7819	0.7778	0.7403
	Middle	2,324	1,820	0.7276	0.7627	0.7125	0.7775	0.7758	0.7459
	2nd Richest	2,125	1,674	0.7704	0.7826	0.7253	0.7815	0.7058	0.7618
	Richest	1,938	1,594	0.7598	0.7867	0.7462	0.8027	0.7744	0.7448
	Tot/Avg	*12,106*	*9,586*	*0.7505*	*0.7736*	*0.7505*	*0.7736*	*0.7505*	*0.7736*
Inpatient Admissions	Poorest	3,168	2,398	0.1278	0.1323	0.1384	0.1271	0.0982	0.1140
	2n Poorest	2,551	2,100	0.1002	0.1158	0.1089	0.1121	0.1001	0.1125
	Middle	2,324	1,820	0.0861	0.1123	0.0989	0.1059	0.0961	0.1153
	2nd Richest	2,125	1,674	0.0784	0.1260	0.0945	0.1027	0.0928	0.1321
	Richest	1,938	1,594	0.0963	0.1274	0.0956	0.1064	0.1096	0.1298
	Tot/Avg	*12,106*	*9,585*	*0.0978*	*0.1228*	*0.0978*	*0.1228*	*0.0978*	*0.1228*
Medical Checkups	Poorest	3,168	2,398	0.2391	0.3380	0.3846	0.3985	0.2422	0.3273
	2n Poorest	2,551	2,100	0.3081	0.4011	0.3669	0.3872	0.3290	0.4017
	Middle	2,324	1,820	0.3208	0.4475	0.3612	0.3899	0.3474	0.4454
	2nd Richest	2,125	1,674	0.3946	0.5422	0.3798	0.3991	0.4026	0.5308
	Richest	1,938	1,594	0.4313	0.5170	0.4004	0.4218	0.4187	0.4830
	Tot/Avg	*12,106*	*9,586*	*0.3388*	*0.4491*	*0.3388*	*0.4491*	*0.3388*	*0.4491*
Tertiary Hospital Visits	Poorest	3,168	2,398	0.1220	0.0951	0.1478	0.1347	0.0843	0.0705
	2n Poorest	2,551	2,100	0.0942	0.1017	0.1048	0.1088	0.0995	0.1030
	Middle	2,324	1,820	0.0913	0.1072	0.0907	0.1019	0.1107	0.1154
	2nd Richest	2,125	1,674	0.1127	0.0982	0.0942	0.1013	0.1287	0.1070
	Richest	1,938	1,594	0.1442	0.1317	0.1025	0.1173	0.1518	0.1245
	Tot/Avg	*12,106*	*9,586*	*0.1211*	*0.1068*	*0.1211*	*0.1068*	*0.1211*	*0.1068*

[APPENDIX 19] HEALTH CARE UTILISATION CHANGE BY EDUCATION GROUP (2005 & 2008), TOTAL NUMBER

Utilisation Type	Income Quintile	Group Size (N)		Actual Utilisation		Need-Predicted Utilisation		Need-Stdzd Utilisation	
		2005	*2008*	*2005*	*2008*	*2005*	*2008*	*2005*	*2008*
Outpatient Visits	Lowest	1,587	1,041	28.9862	29.5506	26.5602	25.3502	14.5050	16.2794
	2n Lowest	2,891	2,277	21.3939	24.1282	20.9653	20.9516	12.5076	15.2556
	Middle	1,583	1,264	13.9101	14.7664	14.6654	15.9225	11.3236	10.9229
	2nd Highest	3,654	2,986	8.0984	8.8951	7.9675	9.9057	12.2099	11.0685
	Highest	2,390	2,018	5.0706	7.0945	5.6804	7.8393	11.4691	11.3342
	Tot./Avg	*12,105*	*9,586*	*11.8439*	*12.3733*	*11.8439*	*12.3733*	*11.8439*	*12.3733*
Inpatient Admissions	Lowest	1,588	1,041	0.2322	0.2594	0.3184	0.2513	0.0677	0.1621
	2n Lowest	2,891	2,277	0.2278	0.2996	0.2424	0.2219	0.1393	0.2315
	Middle	1,583	1,263	0.1522	0.1688	0.1845	0.1804	0.1215	0.1423
	2nd Highest	3,653	2,986	0.1197	0.1371	0.1176	0.1325	0.1560	0.1584
	Highest	2,390	2,018	0.0808	0.1358	0.0909	0.1153	0.1438	0.1744
	Tot/Avg	*12,105*	*9,585*	*0.1400*	*0.1712*	*0.1400*	*0.1712*	*0.1400*	*0.1712*
Inpatient Days	Lowest	1,588	1,041	4.8652	5.9755	7.5488	4.9791	0.1746	3.8545
	2n Lowest	2,891	2,277	5.7918	5.5650	5.0353	4.2682	3.6146	4.1549
	Middle	1,583	1,263	3.6856	3.2141	3.7523	3.3804	2.7914	2.6919
	2nd Highest	3,653	2,986	2.1973	2.1437	2.0140	2.1988	3.0414	2.8031
	Highest	2,390	2,018	1.3266	1.3366	1.4435	1.8058	2.7413	2.3890
	Tot/Avg	*12,105*	*9,585*	*2.9604*	*2.7301*	*2.9604*	*2.7301*	*2.9604*	*2.7301*
Medical Checkups	Lowest	1,588	1,041	0.2438	0.3595	0.4342	0.4494	0.2088	0.3093
	2n Lowest	2,889	2,275	0.3165	0.4494	0.4644	0.4787	0.2512	0.3699
	Middle	1,583	1,263	0.3133	0.4660	0.4408	0.4675	0.2717	0.3977
	2nd Highest	3,652	2,986	0.3163	0.4210	0.3644	0.3977	0.3511	0.4225
	Highest	2,389	2,018	0.4539	0.5312	0.3397	0.3676	0.5134	0.5628
	Tot/Avg	*12,101*	*9,583*	*0.3492*	*0.4619*	*0.3492*	*0.4619*	*0.3492*	*0.4619*
Health Care Expenditure (KRW)	Lowest	1,588	1,041	483,284	732,281	878,418	850,554	131,822	389,682
	2n Lowest	2,891	2,277	572,781	942,536	770,948	775,748	328,789	693,743
	Middle	1,582	1,264	490,562	688,332	610,786	643,565	406,731	571,723
	2nd Highest	3,653	2,986	369,328	512,976	414,586	459,206	481,698	580,726
	Highest	2,390	2,018	439,848	567,476	366,873	409,149	599,931	685,282
	Tot/Avg	*12,104*	*9,586*	*447,882*	*631,643*	*447,882*	*631,643*	*447,882*	*631,643*

| Utilisation Type	Income Quintile	Group Size (N)		Actual Utilisation		Need-Predicted Utilisation		Need-Stdzd Utilisation	
		2005	*2008*	*2005*	*2008*	*2005*	*2008*	*2005*	*2008*
Outpatient Visits	Lowest	1,588	1,041	0.8885	0.9259	0.9077	0.9452	0.7415	0.7414
	2n Lowest	2,891	2,277	0.8680	0.9047	0.8742	0.9150	0.7546	0.7505
	Middle	1,583	1,264	0.8041	0.8413	0.7911	0.8579	0.7737	0.7441
	2nd Highest	3,654	2,986	0.6978	0.7314	0.6901	0.7534	0.7685	0.7388
	Highest	2,390	2,018	0.6827	0.7094	0.6446	0.7190	0.7989	0.7512
	Tot/Avg	*12,106*	*9,586*	*0.7505*	*0.7736*	*0.7505*	*0.7736*	*0.7732*	*0.7736*
Inpatient Admissions	Lowest	1,588	1,041	0.1454	0.1913	0.1943	0.1683	0.0600	0.1319
	2n Lowest	2,891	2,277	0.1486	0.1751	0.1546	0.1490	0.1029	0.1350
	Middle	1,583	1,264	0.1024	0.1294	0.1211	0.1248	0.0902	0.1134
	2nd Highest	3,654	2,986	0.0840	0.1121	0.0877	0.0997	0.1052	0.1212
	Highest	2,390	2,018	0.0685	0.0964	0.0722	0.0917	0.1052	0.1135
	Tot/Avg	*12,105*	*9,586*	*0.0978*	*0.1228*	*0.0978*	*0.1228*	*0.0978*	*0.1228*
Medical Checkups	Lowest	1,588	1,041	0.2339	0.3496	0.4170	0.4320	0.2047	0.3054
	2n Lowest	2,891	2,277	0.3078	0.4331	0.4507	0.4648	0.2449	0.3561
	Middle	1,583	1,264	0.3043	0.4580	0.4285	0.4547	0.2636	0.3911
	2nd Highest	3,654	2,986	0.3093	0.4044	0.3543	0.3861	0.3428	0.4061
	Highest	2,390	2,018	0.4374	0.5227	0.3314	0.3573	0.4938	0.5532
	Tot/Avg	*12,106*	*9,586*	*0.3388*	*0.4491*	*0.3388*	*0.4491*	*0.3388*	*0.4491*
Tertiary Hospital Visits	Lowest	1,588	1,041	0.1342	0.1360	0.2192	0.1984	0.0252	0.0478
	2n Lowest	2,891	2,277	0.1779	0.1458	0.1824	0.1793	0.1056	0.0767
	Middle	1,583	1,264	0.1405	0.1121	0.1376	0.1456	0.1130	0.0767
	2nd Highest	3,654	2,986	0.0880	0.0984	0.0772	0.0961	0.1210	0.1124
	Highest	2,390	2,018	0.0857	0.0909	0.0857	0.0771	0.1412	0.1240
	Tot/Avg	*12,105*	*9,586*	*0.1129*	*0.1068*	*0.1129*	*0.1068*	*0.1129*	*0.1068*

outpatient visits

inpatient visits

inpatient days

medical checkups

health care expenditure

outpatient visits

inpatient visits

medical checkups

tertiary hospital visits

outpatient visits

inpatient visits

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medical checkups

health care expenditure

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tertiary hospital visits

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medical checkups

health care expenditure

outpatient visits

inpatient admissions

medical checkups

tertiary hospital visits

[APPENDIX 39] CHANGE OF SES-RELATED INEQUITY INDICES B/W 2005 & 2008, TOTAL NUMBER

| SES	Utilisation Type	2005		2008	
		CI	HIwv (Confi. Invervals)	CI	HIwv (Confi. Invervals)
Income	Outpatient Visits	-0.2547	-0.0452 (-0.0656~-0.0248)	-0.1879	-0.0480 (-0.0480~-0.0236)
	Inpatient Admissions	-0.2065	0.0330 (-0.0140~0.0801)	-0.0912	0.0495 (-0.0165~0.1154)
	Inpatient Days	-0.3161	0.0183 (-0.0442~0.0808)	-0.1899	-0.0039 (-0.0685~0.0607)
	Medical Checkups	0.1359	0.1762 (0.1597~0.1927)	0.1413	0.1667 (0.1480 ~0.1855)
	Health Care Expenditure	0.0220	0.1691 (0.1497~0.1884)	0.0852	0.1853 (0.1251~0.2455)
Wealth	Outpatient Visits	-0.1208	-0.0644 (-0.0855`-0.0433)	-0.0643	-0.0378 (-0.0619~-0.0137)
	Inpatient Admissions	-0.0900	0.0142 (-0.0562~0.0475)	-0.0569	-0.0043 (-0.0562~0.0475)
	Inpatient Days	-0.1873	-0.0291 (-0.1032~0.0449)	-0.0880	-0.0116 (-0.0738~0.0505)
	Medical Checkups	0.1058	0.0987 (0.0819~0.1156)	0.1010	0.0905 (0.0703~0.1107)
	Health Care Expenditure	0.1101	0.1343 (0.1116~0.1571)	0.1579	0.1606 (0.1248~0.1964)
Education	Outpatient Visits	-0.3380	-0.0269 (-0.0495~-0.0044)	-0.2884	-0.0570 (-0.0818~-0.0323)
	Inpatient Admissions	-0.1931	0.0476 (0.0069~0.0884)	-0.1906	-0.0251 (-0.1049~0.0547)
	Inpatient Days	-0.3181	0.0408 (-0.0327~0.1143)	-0.2867	-0.0995 (-0.1694~-0.0295)
	Medical Checkups	-0.0826	0.1528 (0.1363~0.1693)	0.0571	0.1158 (0.0966~0.1351)
	Health Care Expenditure	-0.0528	0.1298 (0.1108~0.1487)	-0.1162	0.0409 (-0.0092~0.0911)

[APPENDIX 40] CHANGE OF SES-RELATED INEQUITY INDICES B/W 2005 & 2008, PROBABILITY

SES	Utilisation Type	2005		2008	
		CI	HIwv (Confi. Invervals)	CI	HIwv (Confi. Invervals)
Income	Outpatient Visits	-0.0318	0.0186 (0.0122~0.0250)	-0.0230	0.0093 (0.0024~0.0162)
	Inpatient Admissions	-0.1358	0.0444 (0.0145~0.0744)	-0.0686	0.0397 (-0.0004~0.0799)
	Medical Checkups	0.1383	0.1740 (0.1592~0.1888)	0.1462	0.1682 (0.1507~0.1858)
	Tertiary Hospital Visits	-0.1284	0.1586 (0.1270~0.1903)	-0.0538	0.1358 (0.0986~0.1731)
Wealth	Outpatient Visits	0.0052	0.0126 (0.0062~0.0190)	0.0048	0.0046 (-0.0022~0.0114)
	Inpatient Admissions	-0.0660	0.0107 (-0.0209~0.0424)	-0.0083	0.0321 (-0.0079 ~0.0720)
	Medical Checkups	0.1034	0.0930 (0.0789~0.1089)	0.0395	0.0948 (0.0769~0.1126)
	Tertiary Hospital Visits	0.0512	0.1275 (0.0952~0.1598)	0.1391	0.0788 (0.0424~0.1151)
Education	Outpatient Visits	-0.0579	0.0118 (0.0051~0.0185)	-0.0542	0.0016 (-0.0053~0.0085)
	Inpatient Admissions	-0.1514	0.0413 (0.0089~0.0737)	-0.1299	-0.0272 (-0.0685~0.0140)
	Medical Checkups	0.0808	0.1451 (0.1298~0.1605)	0.0577	0.1138 (0.0956~0.1321)
	Tertiary Hospital Visits	-0.1586	0.1253 (0.0925~0.1581)	-0.0851	0.1050 (0.0688~0.1412)

[APPENDIX 41] OECD ANNUAL DOCTOR CONSULTATION PER CAPITA, 2000 & 2009

Country	2009
Japan	13.2
Korea	13.0
Slovak Republic	12.1
Hungary	12.0
Czech Republic	11.2
Germany	8.2
Belgium	7.6
Spain	7.5
Turkey	7.3
Italy	7.0
Austria	6.9
France	6.9
Poland	6.8
Iceland	6.6
Slovenia	6.6
Australia	6.5
OECD	6.5
Estonia	6.3
Luxembourg	6.3
Israel	6.2
Netherlands	5.7
Canada	5.5
United Kingdom	5.0
Denmark	4.6
New Zealand	4.3
Finland	4.2
Portugal	4.1
Greece	4.0
Switzerland	4.0
United States	3.9
Ireland	3.3
Mexico	2.9
Sweden	2.9
Chile	1.8

Legend: 2000, 2009

[Appendix 42] Higher Education Enrolment Rate Changes in Korea, 1970~2010
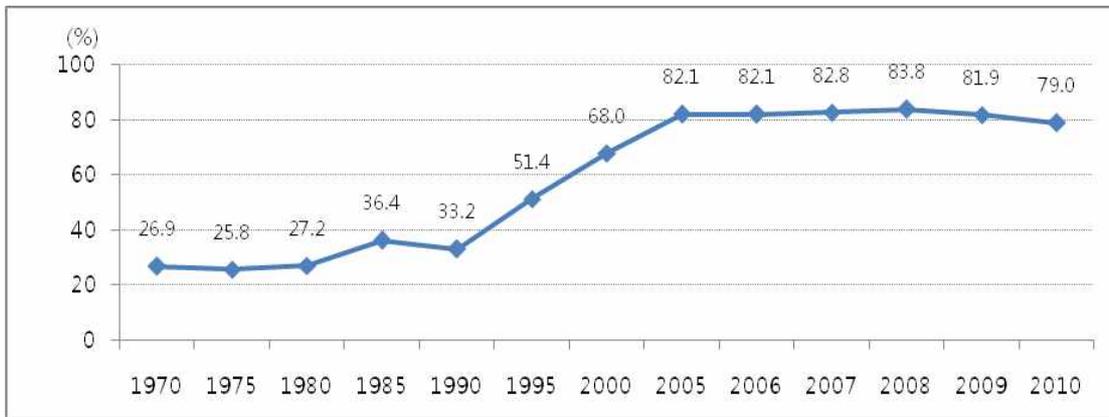
Source: Statistical Yearbook of Education, 2011, Korean Educational Development Institute
Note: Higher Education includes 2-year junior college as well as 4-year college education.

List of Acnonyms

BHPS	British Household Panel Survey
CI	Concentration Index
CT	Computed Tomography
DRGs	Diagnosis-related Groups
ECHP	European Community Household Panel
FFS	Fee-for-Service
GDP	Gross Domestic Product
GP	General Practitioner
HALE	Health-adjusted Life Expectancy
HIES	Household Income & Expenditure Survey
HI_{LG}	Le Grand Index of Horizontal Inequity
HIRA	Health Insurance Review & Assessment Service
$HIwv$	Horizontal Inequity Index (indirectly need-standardized)
$HIwvp$	Horizontal Inequity Index (directly need-standardized)
IHD	Ischaemic Heart Disease
IMF	International Monetary Fund
KDI	Korean Development Institute
KFHR	Korean Federation Medical Activists Groups for Health Right
KHIDI	Korea Health Industry and Development Institute
KNHANES	Korea National Health and Nutrition Examination Survey
KNHI	Korean National Health Insurance
KOWEPS	Korean Welfare Panel Study
KRW	Korean Won
LTCI	Long-term Care Insurance
M & A	Merges and Acquisitions
MEPS	Medical Expenditure Panel Survey (the US)
MOHW	Ministry of Health and Welfare
MRI	Magnetic Resonance Imaging
MSOs	Management Service Organizations
NHI	National Health Insurance
NHIC	National Health Insurance Corporation (former)
NHIS	National Health Insurance Service (present)
NPHS	National Population Health Survey (Canada)
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
OOP	Out-of-Pocket
OR	Odds Ratio
P4P	Pay-for-Performanc

PAHO	Pan American Health Organization
PEI	Prince Edward Island (Canada)
PHI	Private Health Insurance
RBRV	Resource-based Relative Value
RR	Relative Ratio
SAH	Self-Assessed Health
SES	Socioeconomic Status
SMR	Standardized Mortality Ratio
TEH	Total Expenditure on Health
WHO	World Health Organization

References

Ahn, B. C., Engelhardt, K., & Joung, H. (2010). Income-Related Health Inequalities in Korea. *Asia-Pacific Journal of Public Health, 22*(1), 32-41.

Allin, S., Masseria, C., & Mossialos, E. (2006). *Inequality in health care use among older people in the United Kingdom: an analysis of panel data*. LSE Working Papers. London School of Economics and Political Science. London.

Allin, S. (2007). *Equity in Health Care Use in Canada and Its Provinces.* Paper presented at the iHEA 2007 World Congress: Explorations in Health Economics Paper. http://ssrn.com/abstract=991798

Allin, S., Masseria, C., & Mossialos, E. (2009). Measuring Socioeconomic Differences in Use of Health Care Services by Wealth Versus by Income. *Am J Public Health, 99*(10), 1849-1855. doi: 10.2105/ajph.2008.141499

Andersen, R., & Newman, J. F. (2005). Societal and Individual Determinants of Medical Care Utilisation in the United States. *Milbank Quarterly, 83*(4), Online-only-Online-only. doi: 10.1111/j.1468-0009.2005.00428.x

Arneson, R. (2009). Egalitarianism. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy*.

Asada, Y., & Kephart, G. (2007). Equity in health services use and intensity of use in Canada %U http://www.biomedcentral.com/1472-6963/7/41. *BMC Health Services Research, 7*(1 %M doi:10.1186/1472-6963-7-41), 41.

Augustin, B., & Sanga, D. (2002). Income and Wealth. *Perspectives, 3*(11), 15-19.

Bae, J. (2009). Ministries Clash Over For-Profit Hospitals, *The Korea Times*. Retrieved from http://www.koreatimes.co.kr/www/news/nation/2010/05/116_57357.html

Bago, D. U., Teresa, Lindeboom, M., O'Donnell, O., & van Doorslaer, E. (2011). Education-related Inequity in Health Care With Heterogeneous Reporting of Health. *Journal of the Royal Statistical Society, 174*(3), 639-664.

Bago d'Uva, T., O'Donnell, O., & van Doorslaer, E. (2008). Differential health reporting by education level and its impact on the measurement of health inequalities among older Europeans. *International Journal of Epidemiology, 37*(6), 1375-1383. doi: 10.1093/ije/dyn146

Bahk, J., Han, Y., & Kim, S. (2007). Health Inequality among Waged Workers by Employment Status. *Journal of Preventive Medicine and Public Health, 40*(5), 388-396.

Bank of Korea. (2012). National Income Statistics. Seoul: Bank of Korea.

Bentham, J. (1967). *A fragment on government and an introduction to the principles of morals and legislation*. Oxford: Basil Blackwell.

Biro, A. (2011). *Voluntary Private Health Insurance and Health Care Utilisation of People Aged 50+*. Central European University.

Brock, G. (1994). Braybrooke on Needs. *Ethics, 104*(4), 811-823. doi: 10.2307/2382219

Burstrom, B. (2009). Will Swedish healthcare reforms affect equity? *BMJ, 339*. doi: 10.1136/bmj.b4566

Byun, H., & Park, J. (2010). Insurance Customer Survey of 2010 (pp. 286). Seoul: Korea Insurance Research Institute.

Castano, R. A., Arbelaez, J. J., Giedion, U. B., & Morales, L. G. (2002). Equitable financing, out-of-pocket payments and the role of health care reform in Colombia. *Health Policy Plan., 17*(suppl_1), 5-11. doi: 10.1093/heapol/17.suppl_1.5

Chadwick, R. (1998). Management, Ethics and the Allocation of Resources. In S. Dracopoulou (Ed.), *Ethics and Values in Health Care Management*. London: Routledge.

Chen, Z., & Roy, K. (2009). Calculating concentration index with repetitive values of indicators of economic welfare. *Journal of Health Economics, 28*(1), 169-175.

Cho, H., Kwon, G., & Moon, S. (2010). Impact of Private Health Insurance on Health Care Utilisation: Focusing on Analysis of Count Data. *Korean Journal for Policy Analysis and Evaluation, 20*(2), 103-128.

Cho, B., & Lee, C. (2011). Current Situation of National Health Screening Systems in Korea. *Journal of Medical Association, 54*(7), 666-669.

Choi, B., Noh, Y., Yoon, B., Shin, H., Kim, M., & Kim, C. (2004). Analysis of Equity in Health Care and the Policy Measures (pp. 109). Seoul: Korea Institute for Health and Social Affairs.

Choi, B., & Shin, H. (2005a). Equity in Financing and Benefits of the National Health Insurance in Korea. *Health Welfare Policy Forum, 104*, 87-97.

Choi, B., & Shin, H. (2005b). Equity in Health Care Utilisation by Target Population. *Health and Welfare Policy Forum, 106*, 90-98.

Choi, B., Yoon, B., Shin, H., Kim, M., & Kim, C. (2005). The Equity State of the National Health Insurance Program and the Policy Measures *Policy Report* (pp. 273). Seoul: National Health Insurance Corporation.

Choi, J. (2010, October 5). Fifty Percent of the Cancer Patients Who Visit the 'Big Four' Hospitals Are High Incomes, *Daily Medi*. Retrived August 18, 2013

Choo, S., Lee, S., Kim, C., Kim, S., Yoon, T., Shin, H., & Moon, O. (2007). Educational Differences in Health Care Utilisation in the Last Year of Life among South Korea Cancer Patients. *Journal of Preventive Medicine and Public Health, 40*(1), 34-44.

Chun, E., Jang, S., Cho, S., Cho, Y., & Moon, O. (2007). Disparities in Participation in Health Examination by Socio-economic Position among Adult Seoul Residents. *Journal of Preventive Medicine and Public Health, 40*(5), 345-350.

Chun, H., & Kim, I. (2007). Socioeconomic Inequalities in Preventive Services among the Elderly: Results from Medical Checkup, Cancer Check, and BP Check. *Journal of Preventive Medicine and Public Health, 40*(5), 404-410.

Chun, C., Kim, S., Lee, J., & Lee, S. (2009). *Republic of Korea: Health System Review*. Copenhagen.

Chung, Y., Ko, S., Lee, E., Jin, D., Kim, S., Han, J., & Lee, S. (2009). A Report of Korea Health Panel Survey of 2008 (pp. 270). Seoul: Korea Institute for Health and Social Affairs.

Clarke, P. M., Gerdtham, U.-G., Johannesson, M., Bingefors, K., & Smith, L. (2002). On the measurement of relative and absolute income-related health inequality. *Social Science & Medicine, 55*(11), 1923-1928. doi: http://dx.doi.org/10.1016/S0277-9536(01)00321-5

Clarke, P., & Van Ourti, T. (2010). Calculating the concentration index when income is grouped. *Journal of Health Economics, 29*(1), 151-157. doi: http://dx.doi.org/10.1016/j.jhealeco.2009.11.011

Cookson, R., Laudicella, M., & Donni, P. L. (2013). Does hospital competition harm equity? Evidence from the English National Health Service. *Journal of Health Economics, 32*(2), 410-422. doi: http://dx.doi.org/10.1016/j.jhealeco.2012.11.009

Corrieri, S., Heider, D., Matschinger, H., Lehnert, T., Raum, E., & Konig, H.-H. (2010). Income-, education- and gender-related inequalities in out-of-pocket health-care payments for 65+ patients - a systematic review. *International Journal for Equity in Health, 9*(1), 20.

Culyer, A. J., & Wagstaff, A. (1991). Need, Equality and Social Justice (pp. 16). York: Centre for Health Economics, University of York.

Culyer, A. J., & Wagstaff, A. (1992). Need, Equity and Equality in Health and Health Care (pp. 29). York: Centre for Health Economics, University of York.

Culyer, A. J., & Wagstaff, A. (1993). Equity and Equality in Health and Health Care. *Journal of Health Economics, 12*(4), 431-457.

Democratic Labour Party (2009). The wealthiest 5% own 64.8% of the total property in Korea

Donaldson, C., Gerard, K., Jan, S., Mitton, C., & Wiseman, V. (2004). *Economics of health care financing : the visible hand* (2nd ed.). Houndmills: Palgrave Macmillan.

ECuity Project. Retrieved 15 January, 2012, from http://www2.eur.nl/ecuity/

Erreygers, G. (2009). Correcting the Concentration Index. *Journal of Health Economics, 28*(2), 504-515.

Erreygers, G., Clarke, P., & Van Ourti, T. (2012). "Mirror, mirror, on the wall, who in this land is fairest of all?"—Distributional sensitivity in the measurement of socioeconomic inequality of health. *Journal of Health Economics, 31*(1), 257-270.

Fleurbaey, M., & Schokkaert, E. (2009). Unfair inequalities in health and health care. *Journal of Health Economics, 28*(1), 73-90.

Gauld, R., & Uchida, Y. (2011). *Health care systems in Europe and Asia*. London: Routledge.

Graham, H. (2009). *Understanding health inequalities* (2nd ed.). Maidenhead: Open University Press.

Gundgaard, J. (2006). Income-related inequality in utilisation of health services in Denmark: Evidence from Funen County. *Scandinavian Journal of Public Health, 34*(5), 462-471. doi: 10.1080/14034940600554644

Hajizadeh, M., Connelly, L. B., & Butler, J. R. G. (2012). Health policy and horizontal inequities of health-care utilisation in Australia: 1983–2005. *Applied Economics Letters, 19*(18), 1765-1775. doi: 10.1080/13504851.2012.659337

Hernández-Quevedo, C., & Masseria, C. (2013). Measuring Income-related Inequalities in Health in Multi-Country Analysis *Estudios de economía aplicada 31*(2), 455-476.

HIRA (2006). A Study on the Revision of Resource-based Relative Value (RBRV) Score in Korea. Seoul: Health Insurance Review & Assessment Service (HIRA).

HIRA (2011). *Analysis of Medical fees Claim Patterns by Payment System*. Health Insurance Review & Assessment Service. Seoul.

HIRA (2012). Health Insurance Review & Assessment Service, English Brochure, 2011. In HIRA (Ed.). Seoul: HIRA.

HIRA (2013). *Analysis of Medical Fee Claims Pattern with DRGs*. Health Insurance Review & Assessment Service. Seoul.

Holdsworth, C., Finney, N., Farshall, A. & Norman, P. (2013). *Population and the Society*. London: Sage Publication Ltd.

Huh, S., & Lee, S. (2007). Impact of Complementary Private Health Insurance on Public Health Spending in Korea. *Korean Journal of Health Policy & Administration, 17*(2), 1-17.

Hurrelmann, K., Rathmann, K., & Richter, M. (2011). Health inequalities and welfare state regimes. A research note. *Journal of Public Health, 19*(1), 3-13. doi: 10.1007/s10389-010-0359-1

Jeong, S. (2010, 19 December). The Tertiary Hospitals Received More Than 30% of the Total Health Care Costs from the Insurer; It's Growth Rare was more than 60% During the Last 3 Years., *Daily Medi*. Retrived August 3, 2013.

Jo, Y. (2008). A Study on the Characteristics of Welfare Policy Process in Korea: the Case of Health Insurance. *The Korean Political Science Association Journal, 42*(1), 71-91.

Joan, C. (2008). Housing assets and the socio-economic determinants of health and disability in old age. *Health & Place, 14*(3), 478-491.

Jones, A. M., & Rice, N. (2004). *Using Longitudinal Data to Investigate Socioeconomic Inequality in Health*. [Working Paper]. ECuity III Project Working Paper #6.

Jones, R. S. (2010). Health-Care Reform in Korea *Economic Department Working Paper* (pp. 34). Paris: Organisation for Economic Co-operation and Development.

Jung, Y. (2011, January 11). The Five Poisons that harm the National Health Insurance Program in Korea, *Kyunghyang Daily News, Health Care Section*. Retrieved May 27, 2011.

Jung-Choi, K., & Khang, Y. (2009). Contribution of different causes of death to socioeconomic mortality inequality in Korean children aged 1–9: findings from a national mortality follow-up study. *Journal of Epidemiology and Community Health*. doi: 10.1136/jech.2008.086884

Kakwani, N., Wagstaff, A., & van Dooslaer, E. (1997). Socioeconomic Inequalities in Health: Measurement, Computation, and Statistical Inference. *Journal of Econometrics, 77*(1), 87-103.

Kang, H. (2004). *Recent Changes in the Vertical Equity of Insurance Contribution Based on Ability to Pay in the Korean National Health Insurance System: focused on household insurance contribution.* (Ph.D), Yonsei University, Seoul.   (200402)

Kang, E., Cho, Y., Kim, N., & Shin, H. (2008). Equity in Health Expectancy across Social Class and Policy Suggestions (pp. 170). Seoul: Korea Institute for Health and Social Affairs.

Kang, K, Lee, J., Kim, Y., Ahn, T., Jeong, H., Moon, S., . . . Park, J. (2009a). Seven DRGs Development Plan in Korea. Seoul: Health Insurance Review & Assessment Service.

Kang, S., Kwon, Y., You, C., Noh, J., & Kim, S. (2009b). The Benefits of Supplementary Private Health Insurance for Healthcare Utilisation and Survival among Stomach Cancer Patients. *The Tohoku Journal of Experimental Medicine, 217*(3), 243-250.

KFHR (2005). A Joint New Conference of 52 Medical Groups in Objection of the Approval of For-Profit Hospitals. Retrieved from http://www.kfhr.org/board/view.php?id=kfhr_hotnews&no=51

Khang, Y., Lee, S., Lee, M., & Jo, M. (2004a). Socioeconomic Mortality Inequalities in Korea Labor & Income Panel Study. *Korean Journal of Health Policy & Administration, 14*(4), 1-20.

Khang, Y., Lynch, J., Yun, S., & Lee, S. (2004b). Trends in socioeconomic health inequalities in Korea: use of mortality and morbidity measures. *J Epidemiol Community Health, 58*, 308 - 314.

Khang, Y., Lynch, J., & Kaplan, G. (2004c). Health inequalities in Korea: age- and sex-specific educational differences in the 10 leading causes of death. *Int J Epidemiol, 33*, 299 - 308.

Khang, Y., & Kim, H. (2005). Explaining socioeconomic inequality in mortality among South Koreans: an examination of multiple pathways in a nationally representative longitudinal study. *Int J Epidemiol, 34*(3), 630 - 637.

Khang, Y., & Kim, H. (2006). Socioeconomic Mortality Inequality in Korea: Mortality Follow-up of the 1998 National Health and Nutrition Examination Survey (NHANES) Data. *Journal of Preventive Medicine and Public Health, 39*(2), 115-122.

KHIDI & KDI (2009). A Need Assessment Study on the Introduction of Open Investment Hospitals in Korea. Seoul: Ministry of Health & Welfare

Kim, C., Lee, J., Kang, K., & Kim, Y. (1999). Magnitude of Patient's Cost-Sharing for Hospital Services in the National Health Insurance in Korea. *Korean Journal of Health Policy & Administration, 9*(4), 1-14.

Kim, Y. (2002). The Origin and Characteristics of the Social Insurance Systems in Korea: the Cases of National Health Insurance and National Pension Scheme. *Economy and Society, 55*, 8-34.

Kim, C. (2003). *Poverty and Health*. Seoul: Hanul Books.

Kim, H. (2004). How Much Should the Poor Pay for Their Health Care Services under the National Health Insurance System? *Korean Journal of Social Welfare, 56*(3), 113-133.

Kim, H., Khang, Y., Yoon, K., & Kim, C. (2004). Socioeconomic Health Inequalities and Counter Policies in Korea *Research Report* (pp. 375). Seoul: Korea Institute for Health and Social Affairs.

Kim, H. (2005). The relationship of socioeconomic position and health behaviors with morbidity in Seoul, Korea. *Health Soc Welf Rev, 25*(2), 3 - 35.

Kim, C., Lee, S., & Moon, O. (2005a). Equity in Utilisation of Cancer Inpatient Services by Income Classes. *Health Policy, 72*, 187-200.

Kim, J., Ko, S., & Yang, B. (2005b). The effects of patient cost sharing on ambulatory utilisation in South Korea. *Health Policy, 72*(3), 293-300.

Kim, J., Oh, J., Moon, O., & Kwon, S. (2007). Quantitative and Qualitative Difference in the Utilisation of Health Care: Based on the Survey of Gwanju-Jeonnam Residents. *Korean Journal of Health Policy & Administration, 17*(3), 26-49.

Kim, Y. & Lee, H. (2006). Plans for a Reform of Comprehensive National Health Insurnace System: Focusing on the Introduction of Private Health Insurance. *Korean Journal of Policy Analysys and Evaluation, 16*(1), 79-106.

Kim, T. & Choi, Y. (2007). *Analysis of Health Care Utilisation Gap by Income Class.* Paper presented at the 2007 Autumn Conference of the KAPA, Seoul.

Kim, J. & Yoon, T. (2008). Comparisons of Health Inequalities in Small Areas with Using the Standardized Mortality Ratios in Korea. *Journal of Preventive Medicine and Public Health, 41*(5), 300-306.

Kim, C., Lee, S., & Moon, O. (2008a). Inequalities in cancer incidence and mortality across income groups and policy implications in South Korea. *Public Health, 122*(3), 229 - 236.

Kim, S., Ko, Y., Oh, J., & Kwon, S. (2008b). The Effect of Expanding Health Insurance Benefits for Cancer Patients on the Equity in Health Care Utilisation. *Korean Journal of Health Policy & Administration, 18*(3), 90-109.

Kim, T., Choi, Y., & Lee, K. (2008c). Analysis on the Differences in Medical Service Usage in terms of Income Level. *Korean Journal of Social Security, 24*(3), 53-75.

Kim, T. & Huh, S. (2008). Changes in financial burden of health expenditures by income level. *Korean Journal of Health Policy & Administration, 18*(4), 23-48.

Kim, Y. & Yang, B. (2009). The Trend in Catastrophic Health Payments by Income Strata in South Korea. *Health Economics and Policy, 15*, 59-77.

Kim, H. & Ruger, J. (2010). Socioeconomic disparities in behavioral risk factors and health outcomes by gender in the Republic of Korea. *BMC Public Health, 10*(1), 195.

Kim, M., Chung, W., Lim, S., Yoon, S., Lee, J., Kim, E., & Ko, L. (2010). Socioeconomic Inequality in Self-Rated Health Status and Contribution of Health Behavioral Factors in Korea. *Journal of Preventive Medicine and Public Health, 43*(1), 50-61.

Kim, H., & Yeo, J. (2013). A Comparison of Korean Health Status and Health Care System Performance with OECD countries. *Health and Welfare Policy Forum, 196*, 89-102.

Kjellsson, G. & Gerdtham, U.-G. (2013). On correcting the concentration index for binary variables. *Journal of Health Economics, 32*(3), 659-670. doi: http://dx.doi.org/10.1016/j.jhealeco.2012.10.012

Koechlin, F., Lorenzoni, L., & Schreyer, P. (2010). *Comparing Price Levels of Hospital Services Across Countries*.

Kondo, A. & Shigeoka, H. (2012). *Effects of Universal Health Insurance on Health Care Utilisation, Supply-Side Responses and Mortality Rates: Evidence from Japan*.

Kong, M. & Lee, H. (2001). Income-related Inequalities in Health: Some Evidence from Korean Panel Data. *Appl Econ Lett, 8*(4), 239 - 242.

Koolman, X. & van Doorslaer, E. (2004). On the interpretation of a concentration index of inequality. *Health Economics, 13*(7), 649-656. doi: 10.1002/hec.884

Kwon, S., Yang, B.-m., Lee, T. J., Oh, J., & Lee, S. H. (2003). Equity in Health Care Utilisation in South Korea. *Korean Health Economic Review, 9*(2), 13-24.

Kwon, S. & Reich, M. R. (2005). The Changing Process and Politics of Health Policy in Korea. *Journal of Health Politics, Policy and Law, 30*(6), 1003-1025.

Layte, R. & Nolan, B. (2004). *Equity in the Utilisation of Health Care in Ireland*. Economic and Social Review.

Le Grand, J. (1987). Equity, health, and health care. *Social Justice Research, 1*(3), 257-274. doi: 10.1007/BF01047663

Lee, K. & Yoon, H. (2001). Relationship between Inequalities in Health and Inequalities in Socioeconomic Status. *Journal of Korean Academy of Community Health Nursing, 12*(3), 609-619.

Lee, G. (2003). *A Study on Changes of Contribution Burden Before and After the Integration of Health Insurance for Employee Insured.* (Master), Chung-Ang University, Seoul.

Lee, K. (2005a). *Assessing the Variation of Length of Stay within the Diagnosis-related Groups.* (Master of Public Health), Yonsei University, Seoul.   (KDMT1200554451)

Lee, M. (2005b). Health Inequalities among Korean Adults: Socioeconomic Status and Residential Area Difference. *Korean Journal of Sociology, 39*(6), 183-209.

Lee, W. (2005c). Equity in Urban Households' Out-of-Pocket Payments for Health Care. *Korean Journal of Health Policy & Adminstration, 15*(1), 30-56.

Lee, Y. & Kim, S. (2006). A Equity in the Co-payment and Utilisation of National Health Insurance by Income Class. *Social Welfare Policy, 24*, 173-199.

Lee, J. (2009). *Horizontal Equity in Health Care Utilisation: Age-based Analysis.* (Master), Seoul National University, Seoul.   (53)

Lee, Y. (2009). A Study on the Process of Decision-Making for the Promotion of the Private Health Insurance. *Korean Journal of Health and Medical Sociology, 26*, 5-39.

Lee, Y. (2010). A Equity in Health Care Utilisation by Health Statuss. *Korea Society Policy Review, 17*(1), 267-290.

Lim, J. (2010). Is the Democratic Party Supporting the Expansion of Private Health Insurance Market?, *PRESSian*.

Liu, X., Tang, S., Yu, B., Phuong, N., Yan, F., Thien, D., & Tolhurst, R. (2012). Can rural health insurance improve equity in health care utilisation? a comparison between China and Vietnam. *International Journal for Equity in Health, 11*(1), 10.

Lu, R., Leung, G. M., Kwon, S., Tin, K. Y. K., van Doorslaer, E., & O'Donnell, O. (2007). Horizontal equity in health care utilisation evidence from three high-income Asian economies. *Social Science & Medicine, 64*(1), 199-212.

Macinko, J. & Lima-Costa, M. F. (2012). Horizontal equity in health care utilisation in Brazil, 1998-2008 %U http://www.equityhealthj.com/content/11/1/33. *International Journal for Equity in Health, 11 %@ 1475-9276*(1 %M doi:10.1186/1475-9276-11-33), 33.

Masseria, C. (2003). *Equity in the Delivery of Inpatient Care in Italy*.

Masseria, C., Koolman, X., & van Doorslaer, E. (2004). *Equity in the Delivery of Inpatient Care in the European Union: A Pooled Analysis*.

Masseria, C. (2007). Inequalities in Health and Access to Health Care *Discussion Paper*.

Maynard, A. (2001). Ethics and health care 'underfunding'. *Journal of Medical Ethics, 27*(4), 223-227. doi: 10.1136/jme.27.4.223

Merzel, C. (2000). Gender differences in health care access indicators in an urban, low-income community. *American Journal of Public Health, 90*(6), 909-916. doi: 10.2105/ajph.90.6.909

Ministry of Health and Welfare. (n.d.). Health Insurance Benefit Coverage. Retrieved July 20, 2012, from http://www.mw.go.kr/front_new/jc/sjc0102mn.jsp?PAR_MENU_ID=06&MENU_ID=060206

Ministry of Health and Welfare. (2006). *Plan for Drug Price Rationalization of National Health Insurance in Korea*. Seoul: Ministry of Health and Welfare.

Ministry of Health and Welfare. (2008). A Service User Satisfaction Survey for Long-term Care Insurance in Korea. Seoul: Ministry of Health & Welfare.

Ministry of Health and Welfare. (2010). White Paper on Health & Welfare in Korea 2009. Seoul: Ministry of Health & Welfare.

Ministry of Health and Welfare. (2010). Korean National Health Accounts and Total Health Expenditure in 2008. Seoul: Ministry of Health and Welfare.

Ministry of Health and Welfare. (2013). Korean National Health Accounts and Total Health Expenditure in 2011. Seoul: Ministry of Health and Welfare.

Ministry of Strategy and Finance. (2007). The National Financial Plan, 2007-2011. Seoul: Ministry of Strategy and Finance.

Mooney, G. (1983). Equity in Health Care: Confronting the Confusion. *Effective Health Care, 1*, 179-185.

Mooney, G. (2000). Vertical Equity in Health Care Resource Allocation. *Health Care Analysis, 8*(3), 203-215. doi: 10.1023/A:1009439917796

Mun, S. (2004). Equity in the Finance and Delivery of Health Care. *Korean Review of Social Security, 20*(1), 59-81.

Nam, S. (2009). Decomposition of Inequality and Distribution of Household Wealth in Korea. [Decomposition of Inequality and Distribution of Household Wealth in Korea]. *Journal of Economic Studies, 27*(2), 59-86.

Navarro, V., Muntaner, C., Borrell, C., Benach, J., Quiroga, Á., Rodríguez-Sanz, M., . . . Pasarín, M. I. (2006). Politics and health outcomes. *The Lancet, 368*(9540), 1033-1037.

NHIC. (2008). A Survey on the Benefit Coverage Rate of the National Health Insurance in 2008. Seoul: National Health Insurance Corporation.

NHIC (2008). National Health Screening Statistical Yearbook. Seoul: National Health Insurance Corporation.

NHIC. (2010). National Health Insurance Corporation English Brochure, 2009. Seoul: National Health Insurance Corporation.

NHIC. (2011). Korea National Health Insurance Corporation Brochure. In K. N. H. I. Corporation (Ed.). Seoul: Korea National Health Insurance Corporation.

NHIC. (2012). National Health Insurance Corporation English Brochure. Seoul: National Health Insurance Corporation.

NHIC & HIRA. (2009). National Health Insurance Statistical Yearbook of 2008. Seoul: National Health Insurance Corporation (NHIC)

NHIC & HIRA (2012). National Health Insurance Statistical Yearbook of 2011.

NHS. (n.d.). High Quality Care for All, Now and for Future Generations.   Retrieved 20 September, 2012, from http://www.england.nhs.uk/about/equality/

Nozick, R. (1974). *Anarchy, state, and Utopia*: Oxford: Blackwell.

O'Donnell, O., van Doorslaer, E., Wagstaff, A., & Lindelow, M. (2008a). *Analyzing health equity using household survey data : a guide to techniques and their implementation*. Washington, D.C.: World Bank.

O'Donnell, O., van Doorslaer, E., Rannan-Eliya, R. P., Somanathan, A., Adhikari, S. R., Akkazieva, B., . . . Zhao, Y. (2008b). Who Pay for Health Care in Asia? *Journal of Health Economics, 27*, 460-475.

OECD (2003). Equity in the Use of Physician Visits in OECD Countries: Has Equal Treatment for Equal Need Been Achieved? *in Measuring Up: Improving Health System Performance in OECD Countries*: OECD Publishing.

OECD (2008). *Growing Unequal? Income Distribution and Poverty in OECD Countries* (pp. 312 p.). Retrieved from http://ezproxy.york.ac.uk/login?url=http://dx.doi.org/10.1787/9789264044197-en

OECD (2010). OECD Health Data, 2009.

OECD (2010). *Health at a Glance 2009*

OECD (2011). OECD Health Data, 2011. Paris: OECD.

OECD (2012a). OECD Earning Data Base, 2011. Paris: OECD.

OECD (2012b). *OECD economic surveys. Korea*. Paris: Organisation for Economic Co-operation and Development.

OECD (2013). *Country statistical profile: Korea 2013*.

OECD. (n.d.). *OECD indicators.*   Retrieved from http://libproxy.york.ac.uk/login?url=http://www.sourceoecd.org/socialissues/9789264061538

OECD. (n.d.). *OECD Indicators (Korean version)* (pp. 204 p.). Retrieved from http://ezproxy.york.ac.uk/login?url=http://dx.doi.org/10.1787/9789264105133-ko

Ohkusa, Y. & Honda, C. (2003). Horizontal Inequity in Health Care Utilisation in Japan. *Health Care Management Science, 6*(3), 189-196.

PAHO/WHO (1999). Principles and Basic Concepts of Equity and Health. from http://www1.paho.org/english/hdp/hdd/pahowho.pdf

PAHO (2007). Public Policies and Health Systems and Services. In PAHO (Ed.), *Health in the Americas* (Vol. Vol I-Regional). Washington, D.C.: PAHO Scientific and Technical Publication.

Park, S., Shin, Y., & Moon, O. (1996). Equities in the Service Utilisation and Finance in the Korean Health Insurance Program. *Journal of Health Economics and Policy, 2*, 20-41.

Park, B., Jung, M., & Lee, T. (2009). Associations of Income and Wealth with Health Status in the Korean Elderly. *Journal of Preventive Medicien and Public Health, 42*(5), 275-282.

Park, H. J., & Lee, J. H. (2010). The Effect of Socioeconomic Status, Oral Health Conscioucness and Behaviors on Periodontal: Health Disparites among Korean Adults. *Korean Journal of Health Education and Promotion, 27*(1), 61-69.

Park, K. & Kwon, S. (2009). Attitude toward the Increasing Role of Private Health Insurance. *Korean Journal of Health Policy & Administration, 19*(1), 62-80.

Park, N. (2010). *Socioeconomic Health Inequality and Its Trends by Age.* (Master), Seoul National University, Seoul.

Pierson, P. (2004). *Politics in Time: History, Institutions and Social Analysis.* Oxford: Princeton University Press.

KFHR (2005). A Joint New Conference of 52 Medical Groups in Objection of the Approval of For-Profit Hospitals. Retrieved from http://www.kfhr.org/board/view.php?id=kfhr_hotnews&no=51

Ruger, J. P., & Kim, H.-J. (2007). Out-of-Pocket Healthcare Spending by the Poor and Chronically Ill in the Republic of Korea. *Am J Public Health, 97*(5), 804-811. doi: 10.2105/ajph.2005.080184

Saltman, R. B., Figueras, J., & Busse, R. (2004). *Social health insurance systems in western Europe*. Maidenhead: Open University Press.

Salverda, W., Nolan, B., & Smeeding, T. M. (2009). *The Oxford handbook of economic inequality*. Oxford: Oxford University Press.

Sen, A. (1979). *Equality of What?* The Tanner Lecture on Human Values. Stanford University.

Shin, J. (1997). Benefit Coverage and OOP Payment Burdens of Medical Insurance in Korea. *Health and Welfare Policy Forum, 9*, 17-27.

Shin, H., Kim, M., & Kim, J. (2004a). Fairness of Health Care Financing: Progressivity and Redistributive Effect. *Korean Journal of Health Policy & Administration, 14*(2), 17-33.

Shin, S., Kim, C., & Kim, H. (2004b). The Comparison of Household Health Care Expenditure and Income Elasticity by Ability to Pay Levels. *Korean Journal of Health Policy & Administration, 14*(4), 75-87.

Shin, H. & Kim, H. (2006). Income Related Inequality of Dental Care Utilisation in Korea. *Health and Social Welfare Review, 26*(1), 69-94.

Shin, H. & Kim, D. (2008). Health Inequality Measurement in Koera Using EuroQol-5 Dimension Valuation Weights. *Journal of Preventive Medicine and Public Health, 41*(3), 165-172.

Smart, J. J. C., & Williams, B. (1973). *Utilitarianism : for and against*. Cambridge: [s.n.].

Son, M. (2002). The relationships of occupational class, educational level and deprivation with mortality in Korea. *Korean J Prev Med, 35*(1), 76 - 82.

Song, Y. (1998). Socioeconomic Differentials in Mortality: A Cohort Study in 759,665 Korean Men. *Korean Journal of Epidemiology, 20*(2), 219-225.

Statistics Korea (2011). Life Table. Daejeon: Statistics Korea.

Statistics Korea (2012a). Household Income and Expenditure Survey. Daejeon: Statistics Korea.

Statistics Korea (2012b). Yearbook of Consumer Price Index. Daejeon: Statistics Korea.

Steinbach, R. (2009). Equality, Equity and Policy: Concepts of Need and Social Justice.   Retrieved 23 March, 2013, from http://www.healthknowledge.org.uk/public-health-textbook/medical-sociology-policy-economics/4c-equality-equity-policy/concepts-need-sjustice

Sterba, J. P. (1997). *Morality in practice* (5th ed. ed.). Belmont, Calif. ; London: Wadsworth.

Korea Welfare Panel Study. (2007). KOWEPS User's Guide 2006. Seoul: Korea Welfare Panel Study

Korea Welfare Panel Study. (2010). KOWEPS Users' Guide 2009. Seoul: Korea Welfare Panel Study.

UNSD (2012). 2011 Demographic Yearbook. New York: United Nations.

van Doorslaer, E., & Wagstaff, A. (1992). Equity in the delivery of health care: Some International Comparisons. *Journal of Health Economics, 11*(4), 389-411.

van Doorslaer, E., Wagstaff, A., & Rutten, F. F. H. (1993). *Equity in the finance and delivery of health care : an international perspective*. Oxford ; New York: Oxford University Press.

van Dooslaer, E., Wagstaff, A., Bleichrodt, H., Calonge, S., Gerdtham, U.-G., Gerfin, M., . . . Winkelhake, O. (1997). Income-related Inequalities in Health: Some International Comparisons. *Journal of Health Economics, 16*(1), 93-112.

van Doorslaer, E., Wagstaff, A., Burg, H. v. d., Christiansen, T., Graeve, D. D., Duchesne, I., . . . Winkelhake, O. (2000). Equity in the Delivery of Health Care in Europe and the US. *Journal of Health Economics, 19*(5), 553-583.

van Doorslaer, E., Buytendijk, J., & Geurts, J. J. M. (2001). Income-related inequalities and inequities in health care utilisation: Belgium and the Netherlands compared. *Archives of Public Health*.

van Doorslaer, E., Koolman, X., & Jones, A. M. (2004). Explaining income-related inequalities in doctor utilisation in Europe. *Health Economics, 13*(7), 629-647.

van Doorslaer, E., & Masseria, C. (2004). Income-Related Inequality in the Use of Medical Care in 21 OECD Countries *OECD Health Working Papers* (pp. 88). Paris: OECD.

van Doorslaer, E., Clarke, P., Savage, E., & Hall, J. (2008). Horizontal inequities in Australia's mixed public/private health care system. *Health Policy, 86*(1), 97-108. doi: http://dx.doi.org/10.1016/j.healthpol.2007.09.018

Wagstaff, A., Paci, P., & van Doorslaer, E. (1991a). On the measurement of inequalities in health. *Soc Sci Med, 33*, 545 - 557.

Wagstaff, A., van Doorslaer, E., & Paci, P. (1991b). Horizontal Equity in the Delivery of Health Care. *Journal of Health Economics, 10*(2), 251-256.

Wagstaff, A., van Doorslaer, E., & Paci, P. (1991c). On the measurement of horizontal inequity in the delivery of health care. *Journal of Health Economics, 10*(2), 169 - 205.

Wagstaff, A., & van Doorslaer, E. (1992). Equity in the finance of health care: Some international comparisons. *Journal of Health Economics, 11*(4), 361-387.

Wagstaff, A., van Dooslaer, E., Burg, H. v. d., Calonge, S., Christiansen, T., Citoni, G., . . . Winkelhake, O. (1999). Equity in the Finance of Health Care: Some Further International Comparisons. *Journal of Health Economics, 18*(3), 263-290.

Wagstaff, A., & van Doorslaer, E. (2000a). Measuring and Testing for Inequity in the Delivery of Health Care. *The Journal of Human Resources, 35*(4), 716-733.

Wagstaff, A., & van Doorslaer, E. (2000b). Equity in Health Care Finance and Delivery.

Wagstaff, A., van Doorslaer, E., & Culyer, A. J. (2000). Equity in Health Care Finance and Delivery. In J. P. Newhouse & A. J. Culyer (Eds.), *Handbook of Health Economics*. Amsterdam: Elsevier.

Wagstaff, A. (2001). Measuring Equity in Health Care Financing: Reflections on (and Alternatives to) the World Health Organization's Fairness of Financing Index (pp. 21). Washington DC: The World Bank Development Research Group.

Wagstaff, A. (2005). The bounds of the concentration index when the variable of interest is binary, with an application to immunization inequality. *Health Economics, 14*(4), 429-432. doi: 10.1002/hec.953

Whitehead, M. (1991). The concepts and principles of equity and health. *Heal Promot Int, 6*(3), 217 - 228.

WHO (2000). World Health Report 2000- Health Systems: Improving Performance. Geneva: WHO.

WHO (2008). *Closing the gap in a generation : health equity through action on the social determinants of health*. Geneva: Commission on Social Determinants of Health; World Health Organization.

Xu, K., Evans, D. B., Kawabata, K., Zeramdini, R., Klavus, J., & Murray, C. J. L. (2003). Household catastrophic health expenditure: a multicountry analysis. *The Lancet, 362*(9378), 111-117.

Yang, B., Kwon, S., Lee, T., Oh, J., & Lee, S. (2003). Equity in Health Care Financing in South Korea. *Korean Health Economic Review, 9*(2), 1-12.

Yoon, T., Hwang, I., Sohn, H., Koh, K., & Jeong, B. (2005). The Determinants of Private Health Insurnace Purchasing Decision under National Health Insurance System in Korea: The Expanding of Private Health Insurance Market, for the Better or Worse. *Korean Journal of Health Policy & Administration, 15*(4), 161-175.

Yoon, H., & Kwon, H. (2008). Purchase and Utilisation of Private Health Insurance in Korea. *KDI Policy Forum, 204*, 1-13.

You, C., Kang, S., Oh, E., & Kwon, Y. (2010). A Comparison of Single and Multiple Private Health Insurance Purchasers Among Middle-aged and Elderly Korean Adults. *Health and Social Welfare Review, 30*(2), 446-462.

You, C., Kang,, Kwon, Y., & Oh, E. (2011). The Effect of Supplementary Private Health Insurance on Healthcare Utilisation and Expenditure: Indemnity vs. Fixed-Benefit. *Korean Social Security Studies, 27*(1), 277-292.

Yun, H. (2008). Effects of Private Insurance on Medical Expenditure. *KDI Journal of Economic Policy, 30*(2), 99-128.

Zhou, Z., Gao, J., Fox, A., Rao, K., Xu, K., Xu, L., & Zhang, Y. (2011). Measuring the equity of inpatient utilisation in Chinese rural areas %U http://www.biomedcentral.com/1472-6963/11/201. *BMC Health Services Research, 11 %@ 1472-6963*(1 %M doi:10.1186/1472-6963-11-201), 201.

Zhou, Z., Su, Y., Gao, J., Campbell, B., Zhu, Z., Xu, L., & Zhang, Y. (2013). Assessing equity of healthcare utilisation in rural China: results from nationally representative surveys from 1993 to 2008. *Int J Equity Health, 12*, 34. doi: 10.1186/1475-9276-12-34