

Analysis on the differences in medical service usage in terms of income levels

<Abstract>

The purpose of this study is to analyze the differences in medical service usage in terms of income levels and to compare the level of medical service usage of Korea with that of other countries.

First, there are few differences in terms of income levels for quantitative medical service usage.

Second, for qualitative medical service usage, there are lots of differences in terms of income levels, and the qualitative medical service usage of low income groups are low.

Third, the difference in terms of income levels for qualitative medical service usage in older age groups is larger than younger age groups.

Last, quantitatively, medical service usage is similar for Korea and other countries, but qualitatively, Korea has yet to make huge strides for improvement.

Key Word : Differences in medical service usage, Income level, HIwv index

Introduction

Every country of the world has a medical service insurance system to protect the health of its nation's people. Korea also provides a national health insurance system to protect the nation against the risk of disease regardless of economic status for the use of medical services. To completely protect the nation(s) against the risk of disease, medical services should be provided without any payment by the country's citizens. However, most countries require partial payment for the use of medical services to resolve moral hazard in managing the health insurance system. Yet, if the individual's payment burden is too high, the nation can suffer from using medical services - especially those in the lower income groups.

There are two criteria that make up the purpose of this study. First, this study

analyzes the differences of medical service usage in Korea in terms of income level. With the result of the first analysis, the study further compares Korea and other countries to identify where the Korean health insurance level falls among them. When individuals of different income groups use the same medical service at the same price, the burden of medical service usage is heavier on the poor than on the rich. Therefore, if the burden of the medical expense becomes an obstacle in the use of medical services, there can be differences in the degree of using the medical services in terms of income level.

When the medical expense paid by subject(or household) is defined as C , the amount of medical service usage(ex. hospital visits) as Q , and unit expenditure(ex. the medical expense per visit) as P , the relation among the factors become $C = P \times Q$. At this point, Q represents the quantitative medical service usage and P represents the qualitative medical service usage. Furthermore, to understand the medical service usage in terms of income level, we need to analyze Q and P in terms of income levels because the differences in medical service usage in terms of income levels may be different quantitatively and qualitatively. If there are differences in medical service usage in terms of income level, there is a preconceived idea that qualitative differences would be more significant than quantitative differences.

Furthermore, the differences in medical service usage in terms of income levels may be different in terms of age group. For example. the differences in the old age group may be more significant than the differences in the young generation and middle age groups, or vice versa. In other words, because age groups function as control variables to the effects of income levels on medical service usage, interaction effects may exist between income and age variables. In this case, analysis carried out without considering interaction effects, the effects of income levels on medical service usage may become the summation of different effects in terms of age groups. Hence, we cannot know the real effects of income levels on medical services usage.

Therefore, to understand the diverse differences of medical service usage in terms of income level, medical service usage is classified quantitatively and qualitatively, and also by three age groups to show the variety in the differences in medical services usage in terms of income levels.

Data and Method of Analysis

Data and Variables

Statistical Data

The statistical data used in this study is from 'The Health and Nutrition Survey of 2004'. This survey first took place in 1998. Since 1998, the survey has been re-administered every 3 years. The most recent available survey which is from 2004, is used for this particular study.

Variables

Dependent variable

The medical services usage in terms of income level is measured by quantitative and qualitative medical service usage. The quantitative medical service usage is the amount of medical service usage, and it is measured by number of(days of) hospital visits(hospitalization). The qualitative medical service usage is the unit of medical service usage expense, and it is measured by medical expense per visit(day).

It is self-explanatory that the amount of medical service usage would represent the quantitative medical service usage. However, the unit of medical service usage expense representing as qualitative medical service usage needs more of an explanation. The differences in the unit of medical service usage expense refers to the differences in the kinds of treatment. There are two cases of differences in the kinds of treatment. The first case is the differences in the kinds of treatment because the types and the severity of the diseases are different. The second case is the differences in the kinds of treatment, although the types and the severity of the diseases are the same. Between these cases, we can say that the second case reflects the qualitative medical service usage. Hence, the difference in the unit of medical service usage expense due to the differences in the types and the severity of the diseases must be excluded. Thus, medical service usage is analyzed by controlling the status of health. Consequently, for this study, the difference in the unit of medical service usage expense due to the differences in the types and the severity of the diseases is somewhat excluded.

- Amount of medical service usage = Quantitative medical service usage

The amount of medical service usage is measured by the number of hospital visits and days of hospitalization. In the Health and Nutrition Survey, the time period used was 2 weeks for hospital visits, and one year for hospitalization. To convert the 2 week-period for hospital visits into a one year period, the following formula was used.

$$\begin{aligned} & \text{The number of hospital visits in a year} \\ & = \text{The number of hospital visits in 2 weeks} \times 2.2 \times 12 \end{aligned}$$

- Medical expense per visit(day) = Qualitative medical service usage

Medical expense per visit(day) is calculated by dividing the total medical expense in a year by the total number of visits in a year.

Medical expense of hospital visits include the expense for prescription drugs.

$$\text{Medical expense per visit(day)} = \frac{\text{Total medical expense in a year}}{\text{Total number of visits(days of) in a year}}$$

Independent and control variables

Income is the most basic independent variable because the purpose of this study is to analyze the medical services usage in terms of income level. Also, features that impact the medical service usage, which are different according to income levels, must be included as control variables. They include status of health, age and sex. Status of health is a basic variable that determines medical service usage, which is different according to income levels. Therefore, status of health must be controlled to analyze the effect of income on medical service usage. Likewise, this is the same for age.¹⁾ In the case of sex, there is a possibility that there will be the same effects as the effects of status of health and age, and therefore, sex is also included as a control variable.²⁾

1) Looking at the results from previous studies, the regression model of income shows a slope of the coefficient of age as having the shape of an overturned U. This means that with age, income is higher, but with more age, income decreases.

Among these variables, sex and age can be analyzed without any conversions, but status of health and income need to be converted. The following explanation discusses the reasons for and the processes of the conversions.

- Income

In the Health and Nutrition Survey, the income unit is based on household income. The unit of analysis for the study is based on personal unit, and therefore, the household income has been converted to personal income. To carry out the conversion, the following formula created by Wagstaff and Doorslaer(2000) is used.

$$Personal\ Income = \frac{Household\ Income}{E_h}, \quad E_h = (A_h + 0.5K_h)^{0.75}$$

In the formula above, the exponent 0.75 represents the economies of scale in household expenditure. A_h stands for number of adults, K_h for number of children, and 0.5 multiplied by K_h signifies the fact that children spend about half of what adults would spend.

- Status of health

In the survey, status of health consisted of a combination of a subjective question and an objective question .

To assess the status of health among the subjects, the subjective question 'What do you think is the status of your health?' was given the following answer options: ① Very good, ② Good, ③ Average, ④ Poor, ⑤ Very poor. The objective question asked the subjects the number of chronic disease(s) they have. A subject having a chronic disease was determined as someone who has had the condition for at least 3 months or more in the past, or someone who still has the condition and will continue to. The answer options given were: ① 0, ② 1, ③ 2, ④ 3, ⑤ 4 or more.

These two questions were based on a 5 point scale. However, the problem is that the values of the 5 point scale in both questions were not equivalent. Therefore, the

2) At first, the residential district variable also influences the medical service usage and is different in terms of income level. However, the result of analysis is insignificant. Hence, the residential district variable is excluded in the final analysis.

values were converted using a standard score, and combined to assess the status of health.

Method of analysis

In this study, the methods of analysis were the descriptive statistical analysis and the Hiwv index.

The descriptive statistical analysis

The descriptive statistical analysis compares the amount of medical service usage and unit medical expense in terms of 5 income groups. As mentioned before, we can expect the status of health, age and sex variables to influence medical service usage, which are different in terms of income level. To control these effects, the following method can be used.

First, age groups are divided into young generation, middle age, and old age, and each group is compared. This is because age plays a role of a control variable, and also because they are different in terms of income groups

Next, besides comparing real medical service usage(y_i), we also compare the difference($y_i - \widehat{y}_i$) between real and expected medical service usage(\widehat{y}_i). With the formula below, we can estimate the value of \widehat{y}_i

$$y_i = \alpha + \sum_{k=1}^K \beta_k x_{ki} + \varepsilon_i \quad (1)$$

In formula (1), x_{ki} stands for all the dependent variables(status of health, age, sex) except for income. Therefore, \widehat{y}_i is the average medical service usage expected by individual's status of health, age and sex. $y_i - \widehat{y}_i$ is the difference between real and expected medical service usage. $y_i - \widehat{y}_i > 0$ shows those who use medical service more than the average, considering status of health, age and sex, and $y_i - \widehat{y}_i < 0$ measures those who use less than the average. Hence, if we compare the average ($\overline{y_i - \widehat{y}_i}$) of $y_i - \widehat{y}_i$ in terms of income level, we can determine the differences of medical service usage in terms of income level, by controlling the status of health,

age and sex.

The Hiwv index

The Hiwv index shows the equality of medical service usage in terms of income level as one numerical value, which comes from the concentration index.

The Hiwv index is one that uses the value of $\overline{y_i - \widehat{y}_i}$ in terms of income level, which was mentioned in the explanation of the descriptive statistical analysis.³⁾ If the numerical value is positive, this means that high income groups utilize more medical services than lower income groups (by controlling the status of health, age and sex). And if the value is negative, this means that low income groups use more medical services than higher income groups.

The Hiwv index shows the equality of medical service usage in terms of income level as a single numerical value. Hence, it is easier to comprehend the differences of medical service usage in terms of income level and to compare these differences with that of other countries.

Results of Analysis

Sample features

<Table 1> shows the basic sample features used in this study.

<Table 1> Sample features (mean and standard deviation)

3) This is the basic concept of the Hiwv index. But the real process of calculation is different.

	group 1	group 2	group 3	group 4	group 5	Total
Monthly Income (10,000 won)	34.3 (10.3)	64.5 (8.1)	93.1 (8.1)	128.2 (13.1)	221.8 (74.2)	107.5 (72.4)
Age	57.0 (17.1)	46.6 (16.2)	43.9 (15.2)	41.9 (13.4)	41.8 (12.3)	46.3 (16.0)
Sex	0.41 (0.49)	0.45 (0.5)	0.46 (0.5)	0.47 (0.5)	0.48 (0.5)	0.45 (0.5)
subjective status of health	3.3 (0.9)	2.9 (0.9)	2.7 (0.8)	2.6 (0.8)	2.5 (0.8)	2.8 (0.9)
number of chronic disease	2.7 (2.2)	2.0 (1.9)	1.7 (1.7)	1.5 (1.5)	1.4 (1.4)	1.9 (1.8)
number of hospital visits	24.8 (47.1)	17.8 (40.7)	14.8 (35.5)	13.6 (33.5)	12.9 (32.5)	16.8 (38.5)
days of hospitalization	3.3 (16.7)	1.9 (10.2)	1.4 (9.6)	1.1 (7.7)	0.9 (7.3)	1.7 (10.9)
medical expense per hospital visit	15.8 (36.5)	19.3 (38.1)	20.9 (41.0)	26.6 (55.2)	27.7 (51.4)	21.2 (44.2)
medical expense per day of hospitalization	80.7 (125.8)	99.4 (124.1)	114.9 (157.8)	122.9 (154.1)	120.2 (152.3)	104.7 (141.9)
number of sample size	4,520	4,461	4,484	4,544	4,304	22,313

() = standard deviation

In the total sample, average income is about 1,080,000 KRW(Korean Won), average age is about 46, and the ratio of gender, male to female, is similar. The average of subjective status of health is 2.8, which means the subjects think their health is relatively good. The average number of chronic disease is 1.9.

The average number of hospital visits is 16.8, and the average days of hospitalization is 1.7.⁴⁾ Moreover, medical expense per hospital visit is about 21,000 KRW and medical expense per day of hospitalization is about 104,000 KRW.

The following is a breakdown of the results for each income level group.

The average income for group 5 (rich) is about 7 times greater than that of group 1 (poor). Group 1 has the oldest average age, and they are 11 years older than the total average age. Furthermore, there are more females in lower income groups than in higher income groups.

The subjective status of health in lower income groups is greater than that of

4) The average number of hospital visits is merely an estimation of one year, based on the two-week sample study, and is not a real number.

higher income groups, which means the subjects in lower income groups tend to think they are not as healthy. The average number of chronic disease in lower income groups is greater than that of higher income groups, which means that the status of health in lower income groups is not up to par as those in higher income groups. So we can say there is a negative correlation(-) between the status of health and income level. We can also see that the average age in lower income levels is older than those in higher income levels, which means there is a positive correlation between the status of health and age. Consequently, we can see that the differences in age among the different income groups influence the relationship between status of health and income groups.

Also, we can see that the average number of hospital visits and the average day of hospitalization in lower income groups is greater than that of higher income groups. The status of health in lower income groups is also worse than that of higher income groups. Therefore, to find out the influence of income on medical service usage, we have to control the status of health. The medical expense per visit or day in lower income groups is smaller than that of higher income groups.

Results of descriptive statistics analysis

Differences in Quantitative medical service usage

<Table 2> real medical service usage in terms of income level(y)
unit(hospital visit: number of, hospitalization: days of)

income level	young generation			middle age			old age		
	visit	hospita- lization	the # of sample size	visit	hospita- lization	the # of sample size	visit	hospita- lization	the # of sample size
group 1	8.3	1.8	664	20.2	3.2	1,516	32.4	3.8	2,340
group 2	9.9	0.9	1,286	15.6	2.0	2,145	32.1	2.8	1,030
group 3	8.7	0.8	1,541	13.9	1.4	2,248	31.4	2.8	695
group 4	8.8	0.9	1,613	14.4	1.0	2,471	26.1	2.1	460
group 5	9.0	0.5	1,397	13.5	0.9	2,586	24.6	3.2	321

According to Table 2, subjects of low income level groups tend to use medical services more frequently than those in higher income level groups. This trend is

more noticeable in the middle and old age groups than in the young generation group. The next table is expected medical service usage in terms of income level.

<Table 3> expected medical service usage in terms of income level(\hat{y})
unit(hospital visit: number of, hospitalization: days of)

income level	young generation		middle age		old age	
	visit	hospitalization	visit	hospitalization	visit	hospitalization
group 1	9.7	1.0	20.1	2.2	32.7	3.5
group 2	9.3	0.9	16.3	1.7	30.5	3.1
group 3	8.9	0.9	15.2	1.5	30.1	3.1
group 4	8.9	0.9	13.6	1.4	28.0	2.6
group 5	8.6	0.8	12.6	1.2	27.6	2.6

Note: The sample size in this table is the same as Table 2.

Considering health status, low income groups need more medical service than higher income groups. This trend is more noticeable in the middle and old age groups than in the young generation group. This is due to the poor health statuses of lower income groups.

<Table 4> Differences between real and expected medical service usage($y-\hat{y}$)
unit(hospital visit: number of, hospitalization: days of)

income level	young generation			middle age			old age		
	visit	hospitalization	the # of sample size	visit	hospitalization	the # of sample size	visit	hospitalization	the # of sample size
group 1	-1.4	0.8	664	0.1	1.0	1,516	-0.3	0.3	2,340
group 2	0.6	0.0	1,286	-0.7	0.3	2,145	1.6	-0.3	1,030
group 3	-0.1	-0.1	1,541	-1.2	-0.2	2,248	1.4	-0.3	695
group 4	-0.1	0.1	1,613	0.8	-0.4	2,471	-1.9	-0.5	460
group 5	0.4	-0.4	1,397	0.9	-0.3	2,586	-3.0	0.6	321

The results from Table 4 show that after controlling status of health and age, the amount of medical service usage in each income group is either higher or lower than the average. A positive number refers to higher medical service usage than the average, and a negative number refers to lower medical service usage than that of the average. According to the results of this table, the correlation between income levels and medical service usage is undetermined. In the old age group, high income

groups use medical services less than the average.

By assessing the results, quantitative medical service usage is not determined by level of income.

Differences in Qualitative medical service usage

For those participants who stated medical expenses over 300,000 KRW per hospital visit, the medical expense is regarded as 300,000 KRW. Furthermore, for expenses of hospitalization, those who stated medical expenses of over 800,000 KRW per day, the medical expense is regarded as 800,000 KRW. Expenses over 300,000 KRW per visit or over 800,000 KRW per day of hospitalization have been excluded for the validity of the study due to coding errors or cases such as plastic surgery. For real medical expense per visit, the sample size includes only those who actually paid the expense per visit. On the other hand, for medical service usage, the sample size includes even those who did not actually visit the hospital.

<Table 5> real medical expense per visit(day) in terms of income level(y)
unit(1,000 won)

income level	young generation				middle age				old age			
	visit	the # of sample size	hosp-italiz-ation	the # of sample size	visit	the # of sample size	hosp-italiz-ation	the # of sample size	visit	the # of sample size	hosp-italiz-ation	the # of sample size
group 1	20.1	115	112.9	60	16.4	528	79.0	170	15.1	1,218	76.2	364
group 2	18.1	246	107.3	143	21.2	593	96.8	220	17.7	521	95.7	151
group 3	22.1	275	98.8	138	20.0	603	106.1	173	21.3	352	155.7	92
group 4	26.7	298	106.3	163	28.0	676	132.0	195	22.1	203	139.4	57
group 5	30.6	281	120.4	99	27.2	645	113.9	200	23.7	134	150.1	42

According to Table 5, medical expense per visit(day) is higher for high income groups, and lower for low income groups. However, the medical expenses for hospitalization in the young generation group is unclear. A unique result from this study is that the younger generation has spent more per visit than the middle and old age groups. The specific reason for this is unknown. However, we can infer

that people of old age pay less for more visits, whereas those in young generation pay more for less visits.

<Table 6> expected medical expense per visit(day) in terms of income level(\hat{y})
unit(1,000 won)

income level	young generation		middle age		old age	
	visit	hospitalization	visit	hospitalization	visit	hospitalization
group 1	25.5	106.4	23.4	111.3	17.5	98.1
group 2	24.8	106.3	22.9	107.6	17.8	102.0
group 3	24.2	107.5	22.9	105.0	18.0	103.1
group 4	23.9	110.1	22.8	104.1	17.7	103.8
group 5	23.4	107.6	22.6	102.6	17.3	101.9

Note: The sample size in this table is the same as Table 5.

The expected medical expense per visit(day) is higher among the lower income groups of the young generation and middle age. However, this is not the case for those of the old age groups.

<Table 7> Differences between real and expected medical expense per
visit(day)($y - \hat{y}$)
unit(1,000 won)

income level	young generation				middle age				old age			
	visit	the # of sample size	hosp-italiz-ation	the # of sample size	visit	the # of sample size	hosp-italiz-ation	the # of sample size	visit	the # of sample size	hosp-italiz-ation	the # of sample size
group 1	-5.4	115	6.5	60	-7.1	528	-32.3	170	-2.3	1,218	-21.8	364
group 2	-6.7	246	1.1	143	-1.7	593	-10.8	220	-0.1	521	-6.3	151
group 3	-2.1	275	-8.7	138	-2.9	603	1.1	173	3.4	352	52.6	92
group 4	2.8	298	-3.7	163	5.2	676	27.9	195	4.3	203	35.6	57
group 5	7.2	281	12.8	99	4.6	645	11.3	200	6.4	134	48.2	42

According to <Table 7>, excluding hospitalization of the young generation group, low income groups have the tendency to have negative outcomes, while high income groups have positive outcomes. This trend is all the more apparent in the

hospitalization of the old age group. Therefore, there are apparent differences among income groups in the qualitative medical service usage measured by medical expense per visit(day), and this result is most severe in old age.

However, we must be mindful in interpreting Table 7, which shows only the differences in qualitative medical service usage among income groups, but no specific cause for these differences. On that account, there are two possible causes for the differences. One possible reason is that medical expenses are an obstacle for the need of medical service usage. The second possible reason is that high income groups spend more on medical services and/or spend more on high-price medical services.

The Hiwv index analysis

<Table 8> Hiwv index of medical service usage in terms of age group

Age	Hiwv index	amount of medical service usage		medical expense per visit(day)		total medical expense (visit+hospitalization)
		visit	hospitalization	visit	hospitalization	
young generation	real usage index	-0.003	-0.178	0.109	0.013	0.090
	expected usage index	-0.022	-0.029	-0.016	0.004	-0.035
	Hiwv index	0.019	-0.148	0.125	0.009	0.125
middle age	real usage index	-0.069	-0.262	0.107	0.091	0.042
	expected usage index	-0.087	-0.128	-0.006	-0.014	-0.089
	Hiwv index	0.019	-0.134	0.114	0.105	0.131
old age	real usage index	-0.042	-0.087	0.109	0.168	0.079
	expected usage index	-0.032	-0.075	0.002	0.021	-0.031
	Hiwv index	-0.011	-0.012	0.107	0.147	0.110
Total	real usage index	-0.144	-0.271	0.130	0.096	0.001
	expected usage index	-0.142	-0.174	0.023	0.007	-0.105
	Hiwv index	-0.002	-0.097	0.107	0.089	0.107

The HIwv index represents the differences between the real and the expected usage index. Looking at the expected usage index, every age group has a negative outcome in the amount of medical services usage and the total medical expense.⁵⁾ This result means that low income groups have to use more medical services than high income groups when considering status of health.

The sign of the HIwv index is different in the quantitative medical service usage(amount of medical service usage) and the qualitative medical service usage(medical expense per visit/day). It is also different among age groups. In qualitative medical service usage, the HIwv index has positive outcomes in every age group. This result means that high income groups use more medical services than low income groups. In terms of type of medical service, for hospital visits, the older the age group, the smaller the outcome of the HIwv index. However, although the outcomes become smaller with age group, there is not much difference between the positive and negative outcomes. In contrast, for hospitalization, the older the age group is, the larger the outcome of the HIwv index, and the difference between the outcomes are much more noticeably significant. In terms of hospitalization, the older the age group, the inequality due to income levels is severe.

In quantitative medical usage(number of hospital visits), the HIwv index is positive in the young generation and middle age, but the HIwv index is negative in old age. But the absolute value is small, and in this case, it is appropriate to interpret that there is barely any difference due to income level in quantitative medical usage(number of hospital visits). In quantitative medical usage(days of hospitalization), the HIwv index is negative in every age group, but in the old age group, the absolute value is small, and there is barely any difference due to income level. In contrast, the absolute value for young generation and middle age is considerably large which means low income groups use more medical services than high income groups. The reason is unclear, but this may be caused by the differences in opportunity costs of hospitalization.

Comparisons with other Countries

Until now, we have analyzed the differences in the quantitative and qualitative medical services usage in terms of income level. Next, to know the level of

5) Medical expense per visit(day) is irregular according to type of medical service & age group.

medical service usage of Korea, we have compared Korea's Hiwv index with that of other countries.

However, we must be careful in interpreting the Hiwv index of other countries. This is because the year and the sample size of the data are different from the Korean data for this study. Therefore, we need additional analysis.

<Table 9> Hiwv index of countries⁶⁾

country	quantitative usage		qualitative usage
	hospital visit	Hospitalization	medical expense
Korea(1998)	-0.088	-0.213	+0.040
Korea(2004)	-0.002	-0.097	+ 0.107
Finland(1996)	-0.038	-0.282	-0.187
UK(1989)	-0.072	-0.171	-0.117
US(1987)	-0.038	-0.195	-0.145

According to Table 9, for every country, low income groups of countries use more hospital visits and hospitalization. Qualitatively, high income groups in Korea use more medical expenses, while lower income groups use more medical expenses in other countries.⁷⁾

With this result, we may say that compared to other countries, medical service usage is still an obstacle for low income groups in Korea due to economic status. However, this does not mean that the nation of Korea is not protected by its health insurance system. This is because Korea has a shorter history of health insurance system than any other countries. Yet, there are no obstacles in the quantitative usage of medical service in terms of income level, which can be viewed as being successful, though the history of health insurance of Korea is quite short.

Conclusion

The purpose of this study is to analyze the differences in medical service usage in

6) The year and the sample size of the data used for each country are different, and therefore we must consider a margin of error in interpreting Table 10. Moreover, there is a need for additional study with data from recent years and other countries such as those in Asia.

7) US does not have the universal health insurance, different from Korea.

terms of income levels using the Health and Nutrition Survey of 2004 and to compare the level of medical service usage of Korea with that of other countries. The medical service usage is analyzed by quantitative medical service usage and qualitative medical service usage, in three age groups. The methods of analysis are a descriptive analysis, after controlling the differences in health status by regression, and the HIwv index analysis.

The results of this study are the following.

First, there are few differences in terms of income levels for quantitative medical service usage measured by the number of the medical service usage.

Second, for qualitative medical service usage - measured by medical expense per visit - there are lots of differences in terms of income levels, and the qualitative medical service usage of low income groups are low.

Third, the difference in terms of income levels for qualitative medical service usage in older age groups is larger than younger age groups.

Last, quantitatively, medical service usage is similar for Korea and other countries, but qualitatively, Korea has yet to make huge strides for improvement.

What is the implication of this study? This study shows that at the least, there are no differences in the amount of medical service usage in terms of income level. However, this is "a rough picture" of the results drawn by the analysis of 5 income levels and the HIwv index. Therefore, this does not show a concrete feature of each income level group. For example, if the bottom 20 percent income group is compared with high income groups in the amount of medical service usage, there can be no differences. However, the real amount of medical service usage in poor income groups can have major differences. This means that future research on medical service usage in terms of income level(at least in the side of quantitative medical service usage) needs to focus on the analysis of the concrete behavior of the detailed parts such as the lower income group.

Also, in these detailed parts, it does not only include income related parts but also age related parts. The result of this study, analyzed by 3 age groups, shows that there are differences in terms of age group. This has implications that the detailed parts must be consisted of income multiplied by age, not by only income.

We can predict that there are differences in the unit of medical expense. However, we cannot know the reason. There are 2 reasons for the differences in the unit of

medical expense: ① the low income groups cannot use enough medical service, ② the high income groups use very unnecessary expensive medical services. However, we do not know which reason is more important. We also cannot know which reason has more influence on the severity of the differences. To know this, we need more concrete survey data on medical service usage in terms of income level. In conclusion, this study shows more variety of medical service usage than any preceding studies. However, this study suggests the need of additional study with detailed data. I look forward to an appropriate study on this.

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