Associations of Income and Wealth with Health Status in the Korean Elderly

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Objectives : This study aimed to verify the association between wealth or income level and health status after adjusting for other socio-economic position (SEP) indicators among Korean adults aged 45 and over.

Methods : Data were obtained from the 1st wave of Korean Longitudinal Study of Ageing (households: 6,171, persons: 10,254). We used self-rated health status and activities of daily living (ADLs) as dependent variables. Explanatory variables included both net wealth measured by savings, immovables, the other valuated assets and total income including pay, transfer, property and so on. Binary logistic regression was conducted to examine the relationships. Also, in order to determine the relative health inequality across economic groups, we estimated the relative index of inequality (RII).

Results : The inequality of health status was evident among various wealth and income groups. The wealthiest group (5th quintile) was much healthier than the poorest group, and this differential increased with age. Likewise, higher income was associated with better health status among the elderly. However, these effects, as measured by the odds ratio and RII, showed that wealth was more important in determining health status of elderly people.

Conclusions : This study suggests that economic capability plays a significant role in determining the health status and other health-related problems among the elderly. Particularly, our results show that health status of the aged is related more closely to the individual's wealth than income.

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Key words : Socioeconomic position, Wealth, Income, Elderly, Health inequality

INTRODUCTION

Much evidence indicates that social status is related to the factors that determine one's health [1-5]. Of course, social determining factors do not affect health problems directly, not like diseases do [1,6]. Nevertheless, researches concerning each socio-economic position (SEP) index widely show that these are related to overall health status and life expectancy [7-9]. Especially, economic condition is one of the most important variables of SEP. The problem is that economic condition varies according to age. Supposing that income and wealth are two main categories of economic condition, the health status gap between senior (age 45 to 64) and elderly (age 65 or above) groups makes the variation of economic condition more possible.

Income and wealth are SEP indexes which measure economic situation directly [10,11]. Of course the 'income effect,' which affects health, is valid as far as it is consumed or converted to promote a more pleasant living environment. Labor conditions, the living environment, adequate physical activity, good food and other healthy managements are these income effects. Thus, the income should be rechecked in the aspect of consuming behavior.

Higher income alone does not result in better health status, but, rather, other SEP indicators which interact with higher income and other individual situations should be considered. Since income is an indicator relatively measured in the short term, the cumulative effect of income toward one's health is unlikely to be shown without regarding its dynamic aspects in one's lifetime. Thus, there needs to be a close examination when utilizing the income variable [12].

Income is mostly measured as household income rather than individual income. Though the error range is low in the individual income, the household income is useful for this research because the individual income is usually distributed and possessed by family members. Thus, the number of family members, the number of family members with a stable income and their sex, the number and ages of the family members without labor power and the relationship between the provider and the dependent family should be standardized [13]. And for a given period of time, income increases according to age and is influenced by one's employment history. Especially, the income deviation and comparability due to diversity of fringe benefit and wage system by occupation need to be checked. In short, as the direct evaluation scale for economic condition, income is an indicator to grasp the degree of utilization of technique and labor. But it should be analyzed considering the wealth variable based on its fluctuation degree and age effect.

Wealth is not only the accumulation of

income, but is also a factor that consists of various types of assets, such as houses, automobiles, investments, inheritances and family affluence scale (FAS) [14]. In the aspect of public health this accumulation of financial resources is a more significant variable than income to estimate one's health status [1,3,6]. However, when regarding both income and wealth, which may have some reverse relations, it should be approached with care by using the life course approach. Thus, it is necessary to check whether retired people who have low income but much wealth and colored races who have relatively less wealth were targeted. Furthermore, unlike pay income, which is measured while one is working in relation to one's occupation, wealth is a complex factor. Thus, it reflects a relatively long and stable individual market capacity in spite of the changes in the social and political environments. Then market capacity is a concept which includes one's buying power and potential accessibility to resources. While income depends on individual achievements in the labor market, wealth includes finance and immovable property formed by inheritance and transference, not to mention income.

All domestic researches on SEP and perceived health status (PHS) of seniors and the elderly show that one's low socioeconomic status inevitably leads to one's poor health status [15,16]. The lower one's socioeconomic status, the poorer one's health status [17]. Income is an indicator which is able to be compared equally in all age groups, so it is adopted in researches broadly. However, in some researches on the elderly, there is a limitation to explaining their economic status by measuring only their income. In the case of the elderly, most of them are retired from actual work so their incomes tend to be temporary. Thus, the income of an elderly person cannot be the proper indicator to measure his or her economic status [18]. It is reported that not only income but also wealth has a strong relationship with health [19]. Wealth is

significant as it is an accumulative effect of the economic status acquired through one's lifetime. However, the existing researches haven't paid much attention to telling them apart in spite of previous problems. Thus, this research aimed to investigate how the effect of income and wealth varies depending on sex and age (dividing groups into those over 65 and those under 65), with a domestic group of seniors and the elderly as the targets.

METHODS AND MATERIALS

I. Subjects

The research material is Korea Labor Institute's Korean Longitudinal Study of the Aging (KLoSA) dataset. This survey aims to grasp whether seniors and the elderly participate in the labor market, their income and wealth levels, the effect of Social Security on them, their health status, and income transference within families. The survey objects are Korean citizens dwelling nationwide who are not less than 45 years old. In the first round survey, interview surveys on 10,254 persons from 6,171 households of 999 primary sampling units were carried out. The 2006 survey which was used in this research utilized computer assisted personal interviewing (CAPI), which required the use of a laptop computer. When the sample size is bigger and has a more complex question structure than paper and pencil interviewing, CAPI guarantees the reliability of the survey results. The survey item consists of eight categories: population, family, health, employment, income, wealth, subjective expectancy, and quality of life. This research combined the personal data of the elderly and the household data, and analyzed them. In addition, as this survey is a national sample survey, the weight which considers the sampling rate and the response rate was applied.

II. Variables

A. Independent variables

Wealth and income variables were considered as the main SEP index in this research. In the aspect that wealth and income both determine one's economic status, they have considerable correlation, and this can cause a multicollinearity problem. Former researches indicate that the correlation between income and wealth is r=0.05-0.29 [20,21], while this research shows r=0.39. Since variance inflation factor (VIF) of income and wealth variables appeared in a ratio of 1.42 to 3.11 in each model, the problem of multicollinearity is unlikely to occur even if two variables are put simultaneously.

The composition of the wealth and income variables was calculated using the method shown in Tables 1 and 2. The net wealth, which measures one's total assets (real estate assets, financial assets, and other assets) exclusive of one's total debts (bank loan, home mortgage [to be repaid someday], and others) was the base for wealth. Total income, which is the sum of pay income, transfer income, wealth income, and others for the year 2006 was the base for income. This method is a usual calculation method used in researches on household wealth [22-27]. By this method, net wealth and total income are calculated individually and added up conjugally, so that each husband and wife of one couple have the same value. Each couple's (a total of 6,763 couples) net wealth and total income were divided into quintiles (1st is the lowest and 5th is th highest). Then each couple's value of quintile on the wealth and income was equally given to individual persons. This is because any person's income is usually benefit all the members of one's family. Generally, when the income status is measured, the household income is used, but in this research the income and wealth of an elderly couple was used. In researches on the elderly, the measured value per each household means a proxy variable which is used on the premise that a household's

Table 1. A detailed statement of wealth structure

Items	Contents
Total assets	Total savings + The evaluated value of real estate based on the current prices + The evaluated value of other assets
Net assets	Total assets - Total debt
Financial assets	Savings + Deposit money of rent house + Deposit money of monthly rent house
Savings	Accumulative investment + Round sum investment + Others (Lodge money paid + loan money)
Deposit money of rent house	The money paid for rent house, to be returned someday
Total debts	Amount of debts + Deposit money of lease house
Amount of debts	Bank loan + Others (Loaned money from individuals/loaning company/one's holding office + Lodge money due)
Deposit money of lease house	The money paid for lease house, to be repaid someday
Real estate assets	House + The others except house
House	Present dwelling house + The others except present dwelling house
The others except house	Land + Building + Fully or partially paid money for a lot-solid apartment
The other assets	Automobile + The other non-financial assets (Golf and condominium membership, precious metals, antique, work of arts, expensive durable goods)

Table 2. A detailed statement of income structure

Items	Contents
Total income	Pay income + Transfer income + Assets income + Others
Pay income	Pay income + Self-employed income + Agriculture and fishery income + Side job income
Transfer income	Public transfer income + Private transfer income
Public transfer income	Public pension income + Social security income
Public pension income	National pension income + Special occupation pension income
Social security income	Unemployment allowance income + Industrial disaster allowance income + Allowance income by national basic livelihood security program + National patriot annuity income + The other social welfare allowance income
Private transfer income	Total financial support received - Total financial support (Sons and daughters, parents, and the other family)
Assets income	Financial assets income + Real estate income
The others	Personal pension income + The other income and earnings

income will be distributed equally to all family members. However, a directly measured value on the income and wealth of the elderly was available in this dataset, so it was used in this research.

B. Dependent variables

The dependent variables are PHS and activities of daily living (ADL), representing one's health status. PHS consists of a 5-scale item of "very good," "good," "average," "bad," and "very bad"; however, for analysis, a binary value system was adopted: "bad" and "very bad" are considered as 1, and "very good," "good," and "usual" are considered as 0. ADL is a variable which represents one's health status more objective than PHS. 7 ADLs (changing one's clothes, washing one's face/brushing one's teeth/shampooing one's hair, taking a bath/taking a shower, eating a breakfast that has been prepared for them, getting up and getting out of the bedroom, using the bathroom, not letting one's feces and

urine flow) and 10 instrumental activities of daily living (IADL): grooming oneself (combing one's hair, trimming one's nails etc.), cleaning up the house / tidying up rooms / dishwashing, etc., preparing a meal, doing laundry (including hanging clothes out on the laundry line, drying clothes), walking for a short distance outside the home, going out using a vehicle, shopping at a store, managing finances, making and receiving phone calls, and taking medicine. In these 17 daily life activities, if one has trouble performing at least one activity, a score of 1 was assigned; if one is able to perform all activities with no difficulty, then a score of 0 was assigned.

C. Control variables

The existence of a mate, one's education level (graduation from elementary school, graduation from middle school, graduation from high school, graduation from college), type of household (single, couple, 2 generations, 3 generations, etc.), place of

residence (metropolitan city, medium and small city, town) were selected as control variables.

III. Statistical Analysis

All analyses were sorted into two groups by sex and age and then carried out to control the interaction effect of sex and age. The age group was divided into two groups: middle age ($45 \leq x < 65$) and old age ($65 \leq x$). This was done in order to distinguish the different kinds of influence that income and wealth have on the elderly and the non-elderly. First, the descriptive statistics were used for analysis: the frequency and percentage of each variable were checked. Second, wealth and income were divided into quintiles and their influence on PHS and ADL was analyzed by binary logistic regression. The result was presented as odds ratio (OR) and 95% confidence interval (CI). In all analyses, one's education level, type of household, the existence or nonexistence of a mate, and place of residence were controlled.

To check whether an inequality of health according to wealth and income status exists, the relative index of inequality (RII) was calculated. RII is an indicator which reflects the change in the degree of inequality into a numerical value considering the spread of a population according to each SEP. Recently, it is being more frequently used in health inequality research. Since the income and wealth variables used in this research are divided into quintiles, it can be regarded as an ordinal variable. In this case, RII can be used as an indicator which shows a relative gap between the highest group and the lowest group. Especially, RII is useful because it can reflect the differences among a population structure [28]. Furthermore, RII, by single index, briefly presents the difference of dependent variables according to the relative position of income and wealth status. As the dependent variable is a binary value, RII's statistical significance was tested after the degree of relative inequality to income and

wealth was checked by logistic regression. As the lowest ranking group was put as the first group, when RII is smaller than 1, the inequality is disadvantageous to the person who has a higher level of wealth and income; when RII is bigger than 1, the inequality is disadvantageous to the person who has a lower level of wealth and income [29,30].

RESULTS

I. Socio-demographic Characteristics of the Sample

The average age among the research objects were 61.2 (male) and 62.1 (female) and the proportion of those over the age of 65 was 38.9% (male) and 41.8% (female). Overall, the rate of "not good" was higher for those over the age of 65 than for those under the age of 65. This was also the case for women rather than men and for seniors and the elderly, in the aspect of sex. The rate of "have a disability" was higher for those over the age of 65 than for those under the age of 65, results similar to those of the PHS. In the aspect of sex, the rate of "have a disability" was shown to be higher in men than in women when the age is under 65, but higher in women when the age is not less than 65. And then in the case of wealth and income in the SEP index, the wealth and income level tends to be lower when the age is not less than 65 than when it is under 65. In the case of sex, women's wealth and income level tends to be lower than that of men. In the case of academic background, the proportion of those who are at least a high school graduate is 33% when it comes to men who are not less than 65 years old; however it is 7% when it comes to women who are not less than 65 years old.

What is especially noteworthy of these demographic features is that men who are married and who are not less than 65 years old have, by a remarkable contrast, a superior academic background over women who are married and are not less than 65 years old (90% to 43%); and in the case of family type women

who are not less than 65 years old are more likely to remain single than men who are not less than 65 years old (22% to 5%) (Table 3).

II. The Degree of PHS and ADL by Wealth and Income Level

By and large, when other variables are not controlled, the proportion of "not good" in PHS and "have a disability" in ADL according to wealth and income level tend to decrease when the wealth and income level is high (Table 4).

In the case of the distribution according to

sex and age, the proportion of "not good" in PHS is higher when it comes to those aged 65 or above (men 37%, women 56%) than when it comes to those aged under 65 (men 15%, women 23%); and the higher the quintile is, in other words, the higher the wealth and income level is, the lower the proportion of "not good" is. However, in the case of men in the 2nd quintile of the income, the proportion of 'not good' tends to be higher than 1st (the lowest) quintile.

In ADL, the proportion of "have a disability" was higher when the person was aged 65 or

Table 3. General characteristics by demographic and socioeconomic indicators in different age groups

Variables	Male				Female			
	45-64		≥65		45-64		≥65	
	n	%	n	%	n	%	n	%
Health status								
Self-rated health								
Poor	409	15.0	636	36.6	783	23.2	1,359	56.2
No poor	2,321	85.0	1,100	53.5	2,586	76.8	1,060	43.8
Limitation of activities of daily living								
Disability	322	11.8	424	24.4	141	4.2	629	26.0
No disability	2,408	88.2	1,312	75.6	3,228	95.8	1,790	74.0
Socioeconomic position								
Net wealth group (quintile)								
1st (≤20%)	292	10.7	262	15.1	443	13.1	779	32.2
2nd (21-40%)	358	13.1	282	16.2	501	14.9	532	22.0
3rd (41-60%)	519	19.0	449	25.9	706	21.0	507	21.0
4th (61-80%)	723	26.5	391	22.5	827	24.6	337	13.9
5th (81-100%)	838	30.7	352	20.3	892	26.5	264	10.9
Total income group (quintile)								
1st (≤20%)	323	11.8	226	13.0	530	15.7	574	23.7
2nd (21-40%)	192	7.0	414	23.9	417	12.4	887	36.7
3rd (41-60%)	322	11.8	478	27.5	568	16.9	520	21.5
4th (61-80%)	850	31.1	370	21.3	872	25.9	270	11.2
5th (81-100%)	1,043	38.2	248	14.3	982	29.2	168	7.0
Education[*]								
≤Elementary	505	18.5	919	53.0	1,299	38.6	2,101	86.9
Middle	510	18.7	249	14.4	739	22.0	159	6.6
High	1,127	41.3	373	21.5	1,079	32.1	129	5.3
≥College	586	21.5	194	11.2	249	7.4	28	1.2
Demographic characteristics								
Marital status								
Married	2,533	92.8	1,557	89.7	2,839	84.3	1,042	43.1
No partner	197	7.2	179	10.3	530	15.7	1,377	57.0
Housing type								
Own house	2,105	77.1	1,363	78.5	2,567	76.2	1,783	73.7
Lease	321	11.8	170	9.8	398	11.8	299	12.4
Monthly rent	244	8.9	113	6.5	322	9.6	177	7.3
The others	60	2.2	90	5.2	82	2.4	160	6.6
Place of residence								
City	1,249	45.8	708	40.8	1,590	47.2	1,040	43.0
Town	989	36.2	504	29.0	1,147	34.1	703	29.1
Villages	492	18.0	524	30.2	632	18.8	676	28.0
Family type								
Single	69	2.5	82	4.7	198	5.9	539	22.3
Married couple	735	26.9	1,045	60.2	1,032	30.6	701	29.0
2 households	1,570	57.5	354	20.4	1,721	51.1	519	21.5
3 households	321	11.8	203	11.7	356	10.6	562	23.2
The others	35	1.3	52	3.0	62	1.8	98	4.1
Total	2,730	100	1,736	10	3,369	100	2,419	100

[*]Missing value: 8

older (men 24%, women 26%) than when he or she was younger than the age of 65 (men 12%, women 4%); additionally, the higher the wealth and income level was, the lower the proportion of "have a disability" in ADL was.

III. The Effects of Wealth and Income Level on PHS and ADL

Tables 5 and 6 show the wealth and income level's influence on PHS and ADL controlling education, place of residence, family type, and marital status.

In the case of PHS and men aged between 45 and 64, the OR of income level was remarkably higher than wealth level, and it was statistically significant. However, in the case of men who were not less than 65 years old, the significance of OR in wealth increased and the significance of OR in income decreased. In the case of women this tendency existed, too. It was shown that in RII this tendency also existed. By and large, the RII index according to wealth and income level appeared to be over 1; this fact reflects that among the lower class, more people answered 'not good' among other answers in PHS. In the end, in the case of men who were at the age of 65 or above rather than men who were under the age of 65, RII according to wealth level tended to increase; however, RII according to income level tended to decrease. In the case of women who were at the age of 65 or above rather than the women who were under the age of 65, relative inequality according to both wealth and income level tended to decrease. However, when it came to RII according to wealth and income level in each age group; for those under the age of 65, relative inequality according to income level tended to be larger than relative inequality according to wealth level; however, for those aged 65 or above, RII according to wealth level tended to be larger than RII according to income level.

In the case of ADL, it was shown that both men and women aged between 45 and 64 wealth and income level do not have a

significant correlation with each other. However, in the aged 65 or above group and in the case of men, the correlation of wealth level and ADL appeared statistically significant in the lowest quintile (1st quintile), and in the aged 65 or above group and in the case of women, both wealth level and income level had statistically significant influence on the low quintiles (1st and 2nd quintile). Additionally, the OR of wealth was bigger than the OR of income. In the case of RII, the OR of relative inequality according to the wealth level of men at the age of 65 or above was 2.19 (95% CI, 1.42-3.39), and the OR of relative inequality according to the wealth level of women at the age of 65 or above was 5.04 (95% CI, 3.32-7.66). This means that relative inequality according to wealth level is greater than relative inequality according to income level; especially when it comes to women, the degree of inequality is significant.

DISCUSSION

This research's significance is that it targeted seniors and the elderly to examine economic

conditions that affect their health status in the aspect of income factor and wealth factor. Especially, in the aspect of health inequality research, the quintile of income and wealth status was sought to analyze how an economic gap relates to a health status gap.

The result is that income and wealth have a statistically significant correlation with the health status of seniors and the elderly. Especially, in the case of the aged (age 65 or above), the effect of wealth tends to be greater than that of income than in the case of those under the age of 65. In other words, the relative inequality in the health status of the aged will be more apparent when the wealth variable is considered with the income variable. Moreover, the degree of relative inequality differs according to sex. In the case of men, the relative inequality in PHS between the upper class and the lower class was larger than in the case of women. On the other hand, in the case of women, the degree of RII in the aspect of ADL is greater than in the case of men. And also, in the case of PHS, as the subjects grew older, it came out that inequality more related to wealth than income was expanding. This

Table 4. Self-rated health and limitation of activities of daily living (ADL) by net wealth and total income

| Sex | Age | Quintile | Net asset | | | | Total income | | | |
| | | | Poor* | | Disability † | | Poor* | | Disability † | |
			n	%	n	%	n	%	n	%
Male	45 - 64	1st (lowest)	78	26.7	35	12.0	70	21.7	40	12.4
		2nd	82	22.9	40	11.2	66	34.4	27	14.1
		3rd	79	15.2	74	14.3	97	30.1	53	16.5
		4th	93	12.9	87	12.0	115	13.5	98	11.5
		5th (highest)	77	9.2	86	10.3	61	5.9	104	10.0
		total	409	15.0	322	11.8	409	15.0	322	11.8
	≥65	1st (lowest)	136	51.9	98	37.4	94	41.6	62	27.4
		2nd	133	47.2	85	30.1	189	45.7	121	29.2
		3rd	163	36.3	84	18.7	191	40.0	121	25.3
		4th	118	30.2	86	22.0	91	24.9	78	21.1
		5th (highest)	86	24.4	71	20.2	71	28.6	42	16.9
		total	636	36.6	424	24.4	636	36.6	424	24.4
Female	45 - 64	1st (lowest)	149	33.6	22	5.0	150	28.3	25	4.7
		2nd	163	32.5	24	5.0	138	33.1	31	7.4
		3rd	183	25.9	36	5.1	191	33.6	28	4.9
		4th	165	20.0	33	4.0	199	22.8	25	2.9
		5th (highest)	123	13.8	26	2.9	105	10.7	32	3.3
		total	783	23.2	141	4.2	783	23.2	141	4.2
	≥65	1st (lowest)	450	57.8	301	38.6	338	58.9	189	32.9
		2nd	347	65.2	159	30.0	521	58.7	269	30.3
		3rd	286	56.4	82	16.2	296	56.9	113	21.7
		4th	178	52.8	58	17.2	131	48.5	35	13.0
		5th (highest)	98	37.1	29	11.0	73	43.5	23	14.0
		total	1,359	56.2	629	26.0	1,359	56.2	629	26.0

*Self-rated health, †Limitation of ADL

Table 5. Effects on self-rated health and limitation of activities of daily living (ADL) - Men*

Variable	Self-rated Health †				Limitation of ADL †			
	45-64		≥65		45-64		≥65	
Net asset	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
5th (highest)	1.00		1.00		1.00		1.00	
4th	1.08	0.77-1.51	1.19	0.85-1.67	1.15	0.83-1.59	1.02	0.71-1.47
3rd	1.03	0.72-1.49	1.31	0.93-1.82	1.33	0.94-1.89	0.75	0.52-1.10
2nd	1.43	0.98-2.10	2.02	1.41-2.90	0.95	0.62-1.45	1.45	0.98-2.14
1st (lowest)	1.55	1.04-2.31	2.56	1.77-3.71	0.92	0.59-1.46	1.88	1.27-2.78
RII	1.64	1.07-2.54	3.19	2.14-4.74	1.00	0.64-1.58	2.19	1.42-3.39
Total income	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
5th (highest)	1.00		1.00		1.00		1.00	
4th	1.80	1.28-2.53	0.80	0.55-1.16	1.12	0.82-1.52	1.31	0.86-2.01
3rd	4.02	2.75-5.88	1.42	1.00-2.01	1.65	1.12-2.44	1.57	1.04-2.35
2nd	5.15	3.38-7.84	1.74	1.22-2.50	1.36	0.84-2.19	1.67	1.10-2.54
1st (lowest)	2.93	1.97-4.36	1.57	1.04-2.37	1.15	0.76-1.73	1.48	0.93-2.37
RII	5.86	3.85-8.93	2.36	1.57-3.54	1.50	0.95-2.34	1.59	1.02-2.48

RII: relative index of inequality
*Adjusted for family type, marital status, education level and place of residence
†Poor=1, No poor=0, †Disability =1, No disability=0

Table 6. Effects on self-rated health and limitation of activities of daily living (ADL) - Women*

Variable	Self-rated Health †				Limitation of ADL †			
	45-64		≥65		45-64		≥65	
Net asset	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
5th (highest)	1.00		1.00		1.00		1.00	
4th	1.13	0.86-1.48	1.62	1.15-2.27	1.20	0.70-2.05	1.41	0.87-2.31
3rd	1.23	0.93-1.62	1.67	1.21-2.31	1.29	0.75-2.23	1.11	0.69-1.78
2nd	1.71	1.28-2.30	2.44	1.75-3.40	1.15	0.63-2.11	2.33	1.48-3.67
1st (lowest)	1.84	1.36-2.49	1.91	1.38-2.65	1.17	0.63-2.17	3.16	2.02-4.93
RII	2.19	1.57-3.04	1.84	1.30-2.62	1.17	0.60-2.27	5.04	3.32-7.66
Total income	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
5th (highest)	1.00		1.00		1.00		1.00	
4th	1.68	1.28-2.21	1.13	0.76-1.69	0.70	0.40-1.21	0.89	0.50-1.58
3rd	2.18	1.62-2.92	1.31	0.90-1.91	1.02	0.58-1.79	1.44	0.86-2.40
2nd	2.21	1.60-3.03	1.41	0.98-2.05	1.69	0.96-2.98	1.71	1.03-2.82
1st (lowest)	2.21	1.62-3.00	1.54	1.04-2.28	1.22	0.68-2.19	1.70	1.01-2.86
RII	2.56	1.82-3.59	1.50	1.04-2.15	1.90	0.96-3.77	1.73	1.13-2.63

RII: relative index of inequality
*Adjusted for family type, marital status, education level and place of residence
†Poor=1, No poor=0, †Disability =1, No disability=0

result was more remarkable in the case of men than women. This phenomenon comes from the fact that wealth or income level cannot reflect the SEP of women (because of the discrepancy of wealth between a husband and wife) or the intervention of the effect of other variables, like education. Thus, with the stratification of other SEP indicators, it is requested that post researches check the tendency of how and with what each index's effect is replaced in the process of aging. Moreover, in the case of ADL in the group of those aged 65 or above, the influence of wealth and income appears, and the inequality according to wealth level is larger than the inequality according to income level. However, the possibility of a 'disability' in ADL cannot exclude the possibility of reverse causality, so further longitudinal study is requested. If more than three waves of KLoSA data are collected, it will be possible to demonstrate the effect of economic situation (including income), while considering the fluctuation of wealth, on health status. Nevertheless, the degrees of PHS and ADL of the elderly have a relatively deep relation with the economic facts, especially regarding scale of wealth.

Thus, according to the result of this research, the wealth factor of the elderly group should be considered seriously with income and other SEP indexes. According to a recent domestic research which used RII to compare the relationship between income level and PHS, after financial crisis (1997) deepening economic inequality resulted severe gap of health status: forties and fifties had shown the most severe gap and then getting older shown decreasing inequality [31]. The authors supposed that this result was caused by survivor selection bias. However, the assertion that if income and wealth variable had been put into the research these inequality would remain is more proper than the assertion that decease caused low inequality.

Furthermore, for wealth to be elaborately used as SEP index, consented standard for the composition of wealth will be necessary. In this research Smith and Goldman's standard [32], in which SEP is independent variable and health is dependent variable, was revised and adopted. In many domestic and foreign documents there are various measuring methods of wealth level: one is asking the number and possession of specific good [18,33], another is asking both income and wealth in the form of self-report like PHS [34] and the other is adding up wealth, income and debt to decide quintile [35]. According to domestic researches on the composition of household income and wealth, total income and net wealth, which are the results of a method presented in Tables 1 and 2, were used as analyzing tools [22-26]; thus, this research also adopted this method. In that wealth, according to age, has a close relationship with income, on the one hand, wealth is the accumulation of income; however, it can greatly vary according to inheritance and donation, and grasping a household's total among of assets rather than calculating personal economic action is more important [17]. And a proxy index, like immovable property or FAS, should be positively reflected and measured in the aspect of a life course to devise a wealth measuring utility to reflect personal market power stably and in the long

term regardless of changes in society. Comparing the effect of wealth and income as a separate SEP index is a long-term subject of analysis [36,37].

This research analyzed health inequality using conjugal income and wealth of seniors and the elderly. Generally, indicators usually used in researches are the values which is adjusted by the number of family members. Both household income and conjugal income premise that income will be distributed to all family members equally. However, with the judgment that conjugal income is more apt than household income to represent the income of seniors and the elderly, conjugal income was adopted to figure out the income of seniors and the elderly. However, taking a patriarchal family type into consideration, it is possible that income and wealth are not equal to both sexes, so the results regarding the cases of women could have been underestimated. And with the value of conjugal income and wealth as the central feature, quintiles were yielded and applied to the target of research; thus, it is possible that in the case of the group with a low income/low wealth whose members (a family of widower or widow) are not all existent, the result could have been overestimated. Nevertheless, considering the condition of the data and the parsimony of current analysis on the current domestic seniors and the elderly who are able to work, the above method will be reasonable.

This research examined the relation one's wealth and income have with health status in seniors and the elderly using the standard of the age of 65 [under the age of 65 (<65) or not less than the age of 65 (≥65)] using KLoSA 1st year data. The result indicates that, in the case of the elderly, the wealth effect is bigger than the income effect and the degree of health inequality was higher than in the senior group, who are more likely to be affected by income. Thus, when conducting researches on the health equity of the elderly, it is necessary to consider the wealth variable, which has been neglected compared to the income variable. It has been shown that this wealth effect varies depending on sex; therefore, this fact should receive careful examination continuously.

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